

**SERVICE DATA**  
**FILE NO. 300-856**

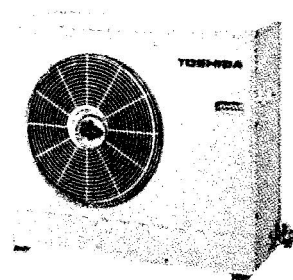
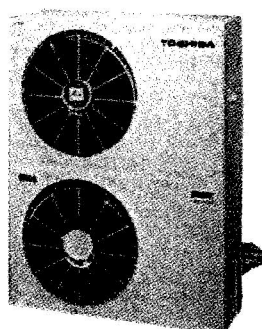
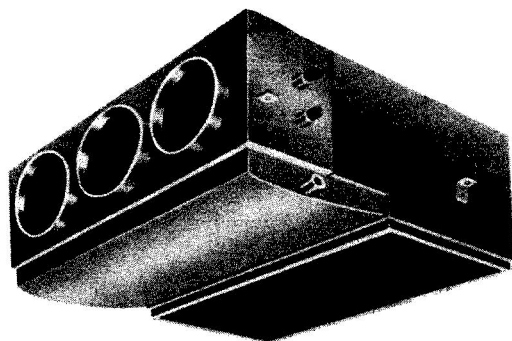
# **TOSHIBA**

AIR-CONDITIONER SPLIT (BUILT-IN DUCT TYPE) HEAT PUMP

## **RAV-260BH/260AH8**

## **RAV-360BH/360AH8**

## **RAV-460BH/460AH8**



Specifications are subject to change without notice.

## CONTENTS

1. SPECIFICATIONS .....	3
2. CONSTRUCTION VIEWS .....	5
3. WIRING DIAGRAM .....	10
4. SPECIFICATIONS OF ELECTRICAL PARTS .....	12
5. REFRIGERANT PIPING DIAGRAM .....	14
6. CONTROL CIRCUIT BLOCK DIAGRAM .....	17
7. REMOTE CONTROLLER .....	18
8. OUTLINE OF CONTROL CIRCUIT .....	26
9. DESCRIPTION OF INDOOR UNIT CONTROL CIRCUIT .....	30
10. DESCRIPTION OF OUTDOOR UNIT CONTROL CIRCUIT .....	37
11. OPERATION OF RELAY PC BOARD (MCC-1075) .....	42
12. EMERGENCY OPERATION (COOLING OPERATION ONLY) .....	43
13. APPLIED CIRCUIT .....	46
14. WIRING FOR GROUP OPERATION .....	47
15. PERFORMANCE CHARACTER .....	48
16. SAMPLES OF INSTALLATION COMBINED WITH OPTIONAL PARTS .....	52
17. CONNECTION FLANGE (REFERENCE) .....	53
18. SHELTER BOARD .....	54
19. EXPLODED VIEWS AND PARTS LISTS.....	55

# 1. SPECIFICATIONS

ITEM	MODEL	RAV-260BH	
Cooling capacity	*1 kcal/h	6,300	
	BTU/h	25,200	
	kW	7.3	
Heating capacity	*2 kcal/h	6,800	
	BTU/h	27,200	
	kW	7.9	
Power source	Phase	3	
	V	380/415	
	Hz	50	
		COOLING	HEATING
Power consumption	kW	2.8	2.7
Power factor	%	86	85
Running current	A	4.7	4.6
Starting current	A	25	
Operating noise (SPL)	Indoor unit	43/40/37	
	Outdoor unit	53	
Refrigerant	Name of refrigerant	R-22	
	Charge volume	2.55	
	Add. volume (20-30m)	35	
Refrigerant control		Capillary tube & Expansion valve	
Interconnection pipe	Larger side size	mm (in.)	φ 15.9
	Coupler style		Flare
	Smaller side size	mm (in.)	φ 9.5
	Coupler style		Flare
	Standard length	m (ft)	5 (16.4')
	Maximum length (of one way)	*3 m (ft)	30 (98.4')
	Maximum height		
	Indoor unit higher	m (ft)	15 (49')
	Outdoor unit higher	m (ft)	30 (98.4')
Condensate drain pipe diameter		mm	φ 32 (OD)
INDOOR UNIT Model		RAV-260BH	
Appearance colour		Black (Zinc galvanized steel + Thermal insulator)	
Dimensions	Height	mm (ft-in.)	320 (1'-19/32")
	Width	mm (ft-in.)	1,000 (3'-3-3/8")
	Depth	mm (ft-in.)	800 (2'-7-31/64")
Net weight	kg (lbs)	53 (117)	
Heat exchanger type		Finned tube	
Indoor fan type		Multi-blade fan	
Air volume	m <sup>3</sup> /h (CFM)	1,140 (671)	
Fan motor output		100	
External static pressure	Standard	4	
	Max. motor	10	
CEILING PANEL Model		RBC-B260PE(W)	
Appearance colour		Silky mist (Munsell 1Y8.9/0.5)	
Dimensions	Height	mm (ft-in.)	40 (1'-37/64")
	Width	mm (ft-in.)	1,080 (3'-6-17/32")
	Depth	mm (ft-in.)	500 (1'-7-11/16")
Net weight	kg (lbs)	6 (13.2)	
Air filter		Washable	
OUTDOOR UNIT Model		RAV-260AH8	
Appearance colour		Bronze white (Munsell 6Y7.5/1)	
Dimensions	Height	mm (ft-in.)	790 (2'-7-3/8")
	Width	mm (ft-in.)	880 (2'-10-5/8")
	Depth	mm (ft-in.)	310 (1'-3/16")
Net weight	kg (lbs)	80 (176)	
Heat exchanger type		Finned tube	
Outdoor fan type		Propeller fan	
Fan motor output		63	
Compressor	Model	YH330X3-MS	
	Output	2.2	
Safety device		High pressure switch, Fuse Overcurrent relay, Crankcase heater Inner overload relay, Float switch	
Flexible duct		RBC-BU1E (W)	
Blowout unit		RBC-FD202E	
Suction canvas		RBC-CA2608E	
Long-life filter kit		RBC-LK260BE	

Specifications are subject to change without notice.

Note 1: Cooling capacity is based on the following temperature conditions.

Indoor air inlet temperature: 27°C DB (80°F DB)  
19.5°C WB (67°F WB)  
Outdoor air inlet temperature: 35°C DB (95°F DB)

Note 2: Heating capacity is based on the following temperature conditions.

Indoor air inlet temperature: 21°C DB (70°F DB)  
Outdoor air inlet temperature: 7°C DB (45°F DB)  
6°C WB (43°F WB)

Note 3: These mean actual length.

Note 4: Operating range of the units

Indoor air temperature  
When cooling  
Maximum 32°C DB, 22.5°C WB (90°F DB, 73°F WB)  
Minimum 18°C DB, 15.5°C WB (65°F DB, 60°F WB)  
When heating  
Maximum 30°C DB (86°F DB)  
Minimum 18°C DB (65°F DB)  
Outdoor air temperature  
When cooling  
Maximum 43°C DB, 25.5°C WB (109°F DB, 78°F WB)  
Minimum 10°C DB (50°F DB)  
When heating  
Maximum 21°C DB, 15.5°C WB (70°F DB, 60°F WB)  
Minimum -10°C WB (14°F WB)

ITEM	MODEL	RAV-360BH	RAV-460BH
Cooling capacity	*1 kcal/h	9,000	11,200
	BTU/h	36,000	44,800
	kW	10.5	13.0
Heating capacity	*2 kcal/h	9,300	11,900
	BTU/h	37,200	47,600
	kW	10.8	13.8
Power source	Phase	3	3
	V	380/415	380/415
	Hz	50	50
		COOLING	HEATING
Power consumption	kW	4.2	5.15
Power factor	%	89	87
Running current	A	6.8	8.5
Starting current	A	42	50
Operating noise (SPL)	Indoor unit dB(A)	45/42/39	46/43/40
	Outdoor unit dB(A)	55	55
Refrigerant	Name of refrigerant	R-22	R-22
	Charge volume kg	3.4	3.9
	Add. volume (20-50m) g/m	50	50
Refrigerant control		Capillary tube & Expansion valve	Capillary tube & Expansion valve
Interconnection pipe	Larger side size mm (in.)	φ 19 (3/4")	φ 19 (3/4")
	Coupler style	Flare	Flare
	Smaller side size mm (in.)	φ 9.5 (3/8")	φ 9.5 (3/8")
	Coupler style	Flare	Flare
	Standard length m (ft)	5 (16.4')	5 (16.4')
	Maximum length (of one way) *3 m (ft)	50 (164')	50 (164')
	Maximum height		
	Indoor unit higher m (ft)	20 (65'6)	20 (65'6)
	Outdoor unit higher m (ft)	50 (164')	50 (164')
Condensate drain pipe diameter	mm	φ 32 (OD)	φ 32 (OD)
INDOOR UNIT Model		RAV-360BH	RAV-460BH
Appearance colour		Black (Zinc galvanized steel + Thermal insulator)	Black (Zinc galvanized steel + Thermal insulator)
Dimensions	Height mm (ft-in.)	320 (1'19/32")	320 (1'19/32")
	Width mm (ft-in.)	1,350 (4'5-5/32")	1,350 (4'5-5/32")
	Depth mm (ft-in.)	800 (2'7-31/64")	800 (2'7-31/64")
Net weight	kg (lbs)	58 (128)	62 (137)
Heat exchanger type		Finned tube	Finned tube
Indoor fan type		Multi-blade fan	Multi-blade fan
Air volume	m <sup>3</sup> /h (CFM)	1,680 (989)	2,040 (1,201)
Fan motor output	W	120	140
External static pressure	Standard mmAq	4	4
	Max. motor mmAq	10	10
CEILING PANEL Model		RBC-B460PE(W)	RBC-B460PE(W)
Appearance colour		Silky mist (Munsell 1Y8.9/0.5)	Silky mist (Munsell 1Y8.9/0.5)
Dimensions	Height mm (ft-in.)	40 (1'-37/64")	40 (1'-37/64")
	Width mm (ft-in.)	1,430 (4'8-19/64")	1,430 (4'8-19/64")
	Depth mm (ft-in.)	500 (1'7-11/16")	500 (1'7-11/16")
Net weight	kg (lbs)	7 (15.4)	7 (15.4)
Air filter		Washable	Washable
OUTDOOR UNIT Model		RAV-360AH8	RAV-460AH8
Appearance colour		Bronze white (Munsell 6Y7.5/1)	Bronze white (Munsell 6Y7.5/1)
Dimensions	Height mm (ft-in.)	1,240 (4'13/16")	1,240 (4'13/16")
	Width mm (ft-in.)	930 (3'5/8")	930 (3'5/8")
	Depth mm (ft-in.)	385 (1'3-5/32")	385 (1'3-5/32")
Net weight	kg (lbs)	98 (216)	115 (254)
Heat exchanger type		Finned tube	Finned tube
Outdoor fan type		Propeller fan	Propeller fan
Air flow volume	m <sup>3</sup> /h (CFM)	6,000 (3,530)	6,000 (3,530)
Fan motor output	W	39 + 63	39 + 63
Compressor	Model	YH406JA	YH506JA
	Output kW	3.0	3.75
Safety device		High pressure switch, Fuse Overcurrent relay, Crankcase heater Inner overload relay, Float switch	High pressure switch, Fuse Overcurrent relay, Crankcase heater Inner overload relay, Float switch
Flexible duct		RBC-BU1E (W)	
Blowout unit		RBC-FD202E	
Suction canvas		RBC-CA460BE	
Long-life filter kit		RBC-LK460BE	

Specifications are subject to change without notice.

Note 1: Cooling capacity is based on the following temperature conditions.

Indoor air inlet temperature: 27°C DB (80°F DB)  
19.5°C WB (67°F WB)  
Outdoor air inlet temperature: 35°C DB (95°F DB)

Note 2: Heating capacity is based on the following temperature conditions.

Indoor air inlet temperature: 21°C DB (70°F DB)  
7°C DB (45°F DB)  
Outdoor air inlet temperature: 6°C WB (43°F WB)

Note 3: These mean actual length.

Note 4: Operating range of the units

Indoor air temperature

When cooling  
Maximum 32°C DB, 22.5°C WB (90°F DB, 73°F WB)  
Minimum 18°C DB, 15.5°C WB (65°F DB, 60°F WB)

When heating  
Maximum 30°C DB (86°F DB)  
Minimum 18°C DB (65°F DB)

Outdoor air temperature

When cooling  
Maximum 43°C DB, 25.5°C WB (109°F DB, 78°F WB)  
Minimum 10°C DB (50°F DB)

When heating  
Maximum 21°C DB, 15.5°C WB (70°F DB, 60°F WB)  
Minimum -10°C WB (14°F WB)

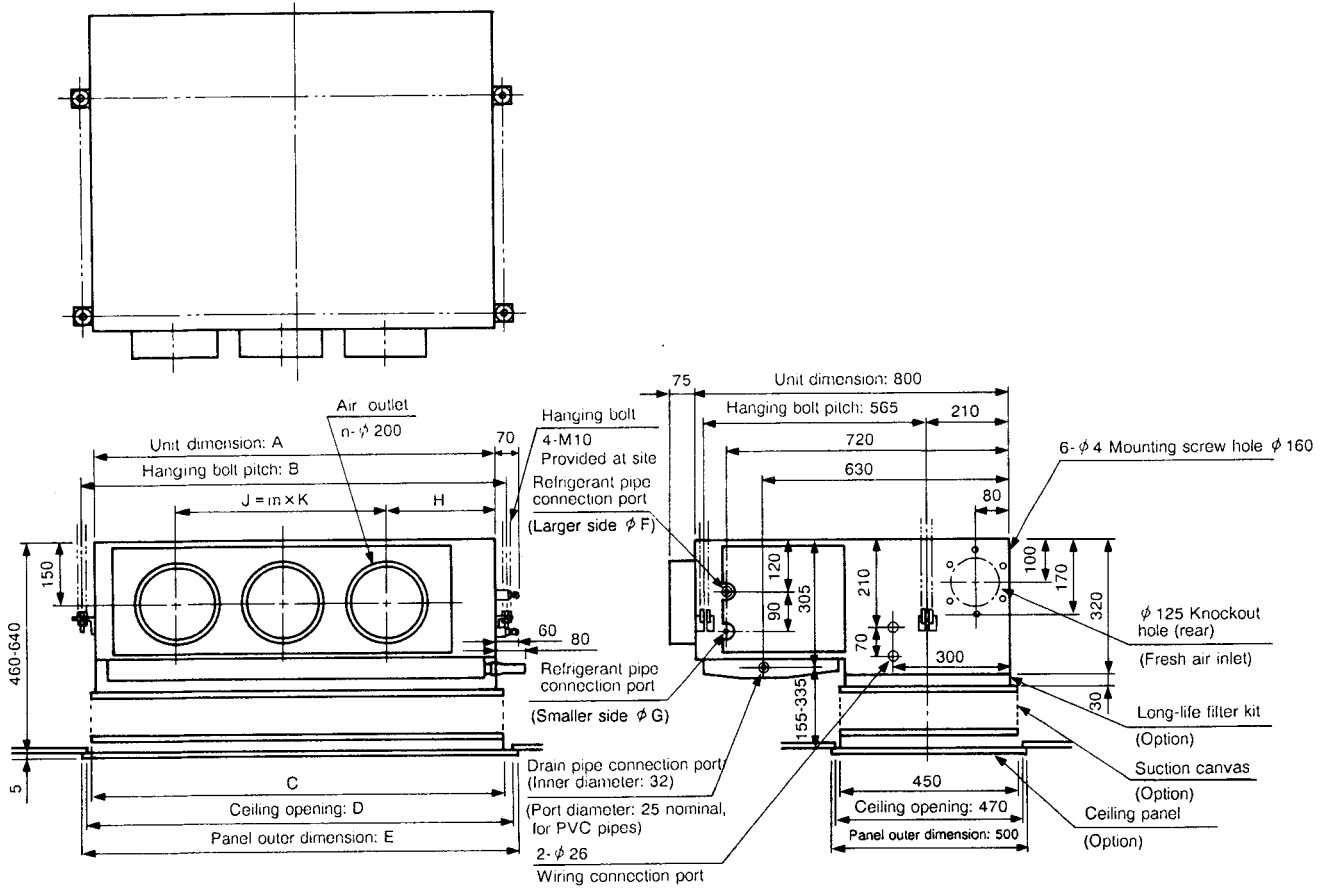
## 2. CONSTRUCTION VIEWS

### 2.1 Indoor unit

RAV-260BH

RAV-360BH

RAV-460BH

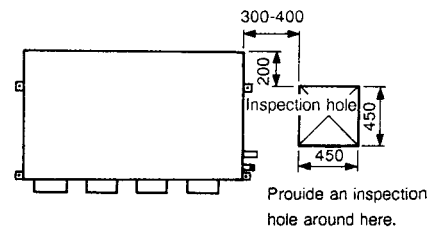


Ensure that there is sufficient space around the indoor units for installation and servicing.

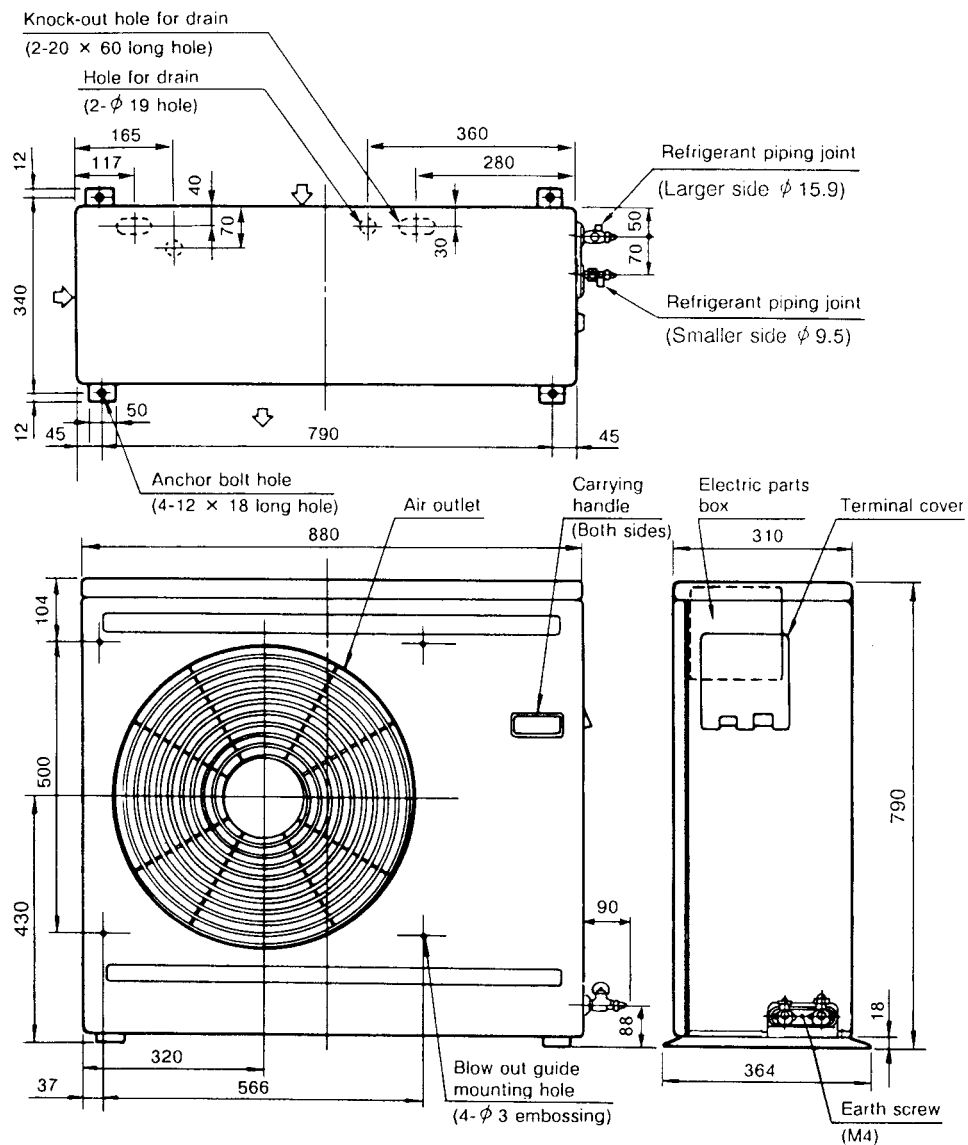
[Indoor unit]

(Unit: mm)

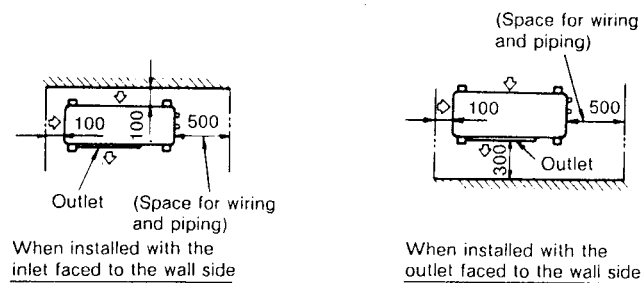
Model	A	B	F	G	H	J	K	M	N
RAV-260BH	1000	1050	15.9	9.5	252	580	290	2	3
RAV-360BH, 460BH	1350	1400	19.0			930	310	3	4



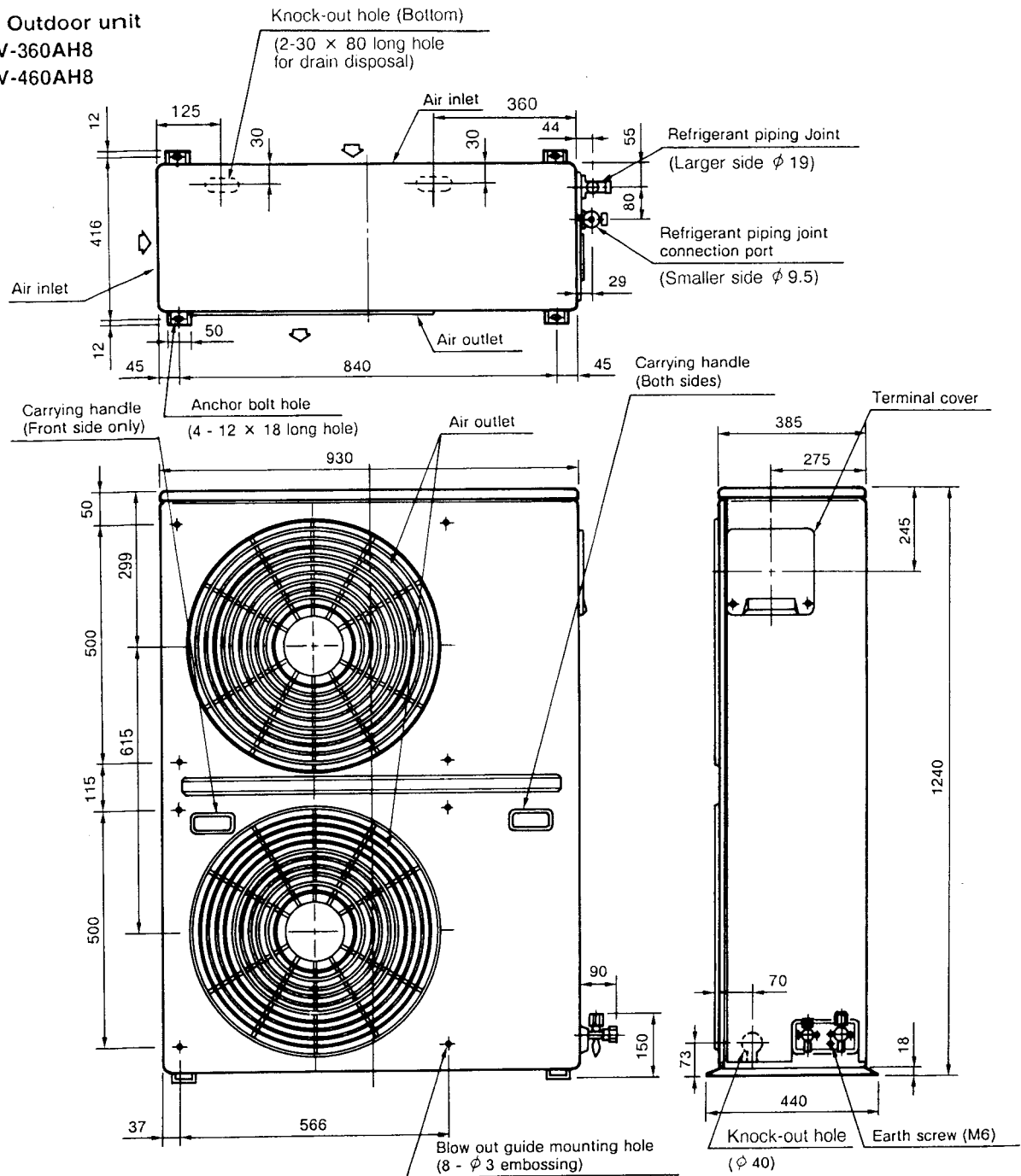
## 2.2 Outdoor unit RAV-260AH8



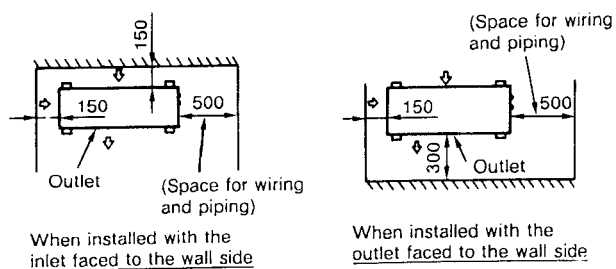
### Space required for service



**2.2 Outdoor unit**  
**RAV-360AH8**  
**RAV-460AH8**

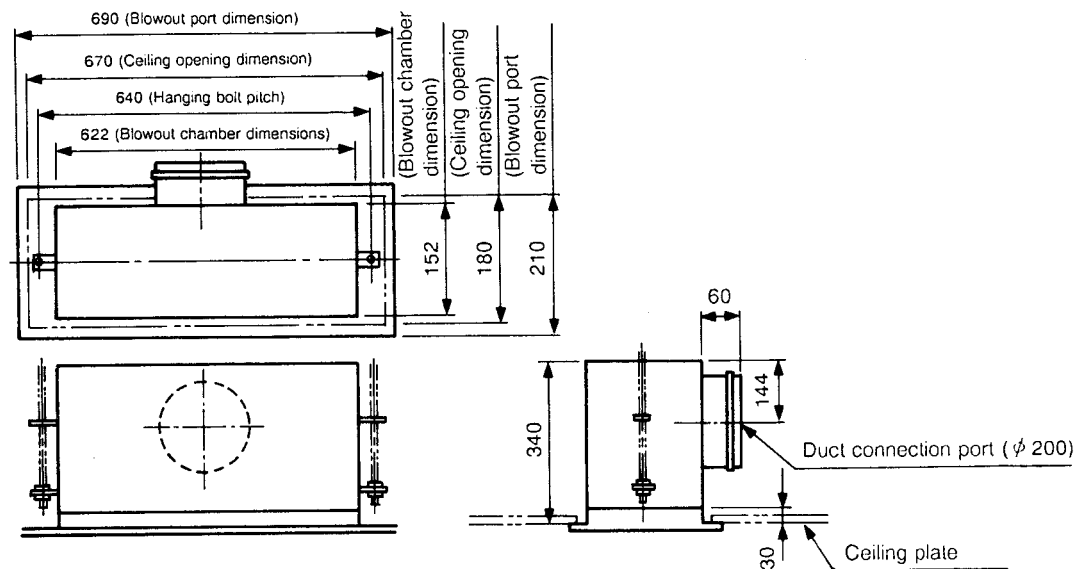


Space required for service

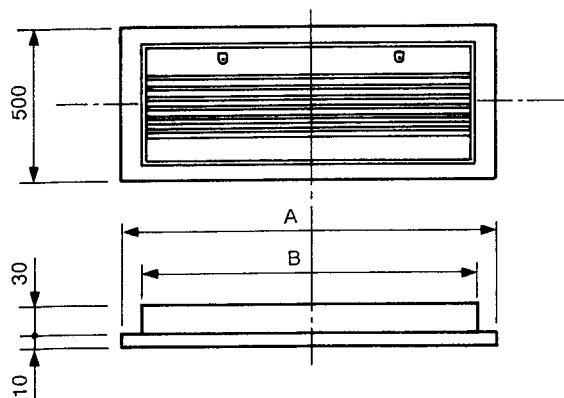


## 2.3 Optional accessories

### Blowout unit RBC-BU1E(W)

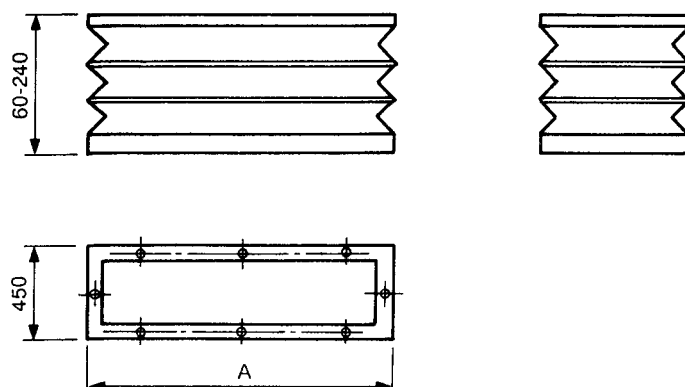


### Ceiling panel RBC-260PE(W), B460PE(W)



Model RBC-	A	B
B260PE(W)	1,080	1,030
B460PE(W)	1,430	1,380

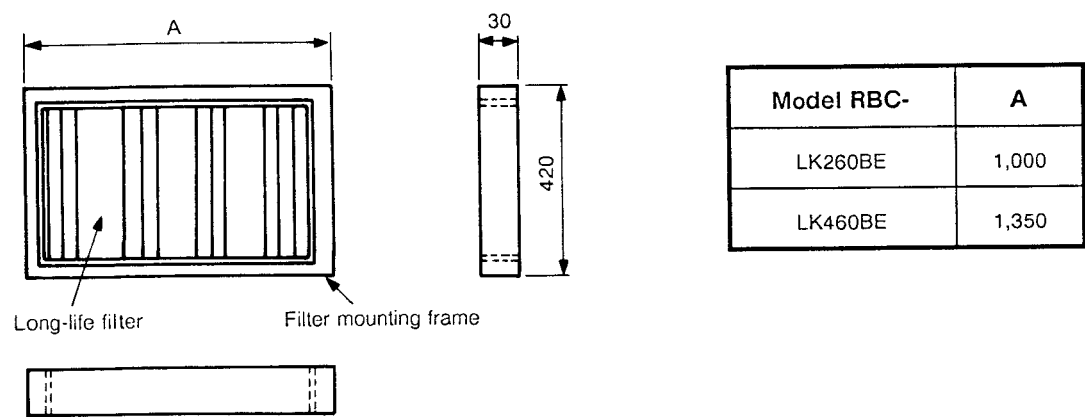
### Suction canvas RBC-CA260BE, CA460BE



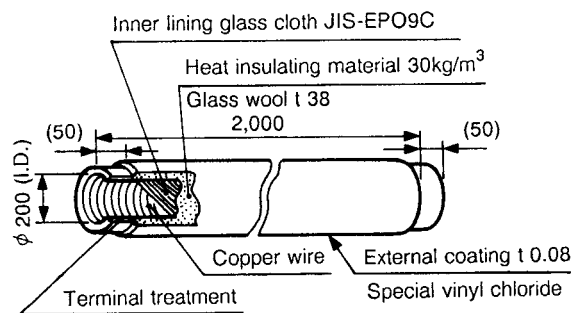
Model RBC-	A
CA260BE	1,025
CA460BE	1,375



Long-life filter kit  
RBC-LK260BE, LK460BE

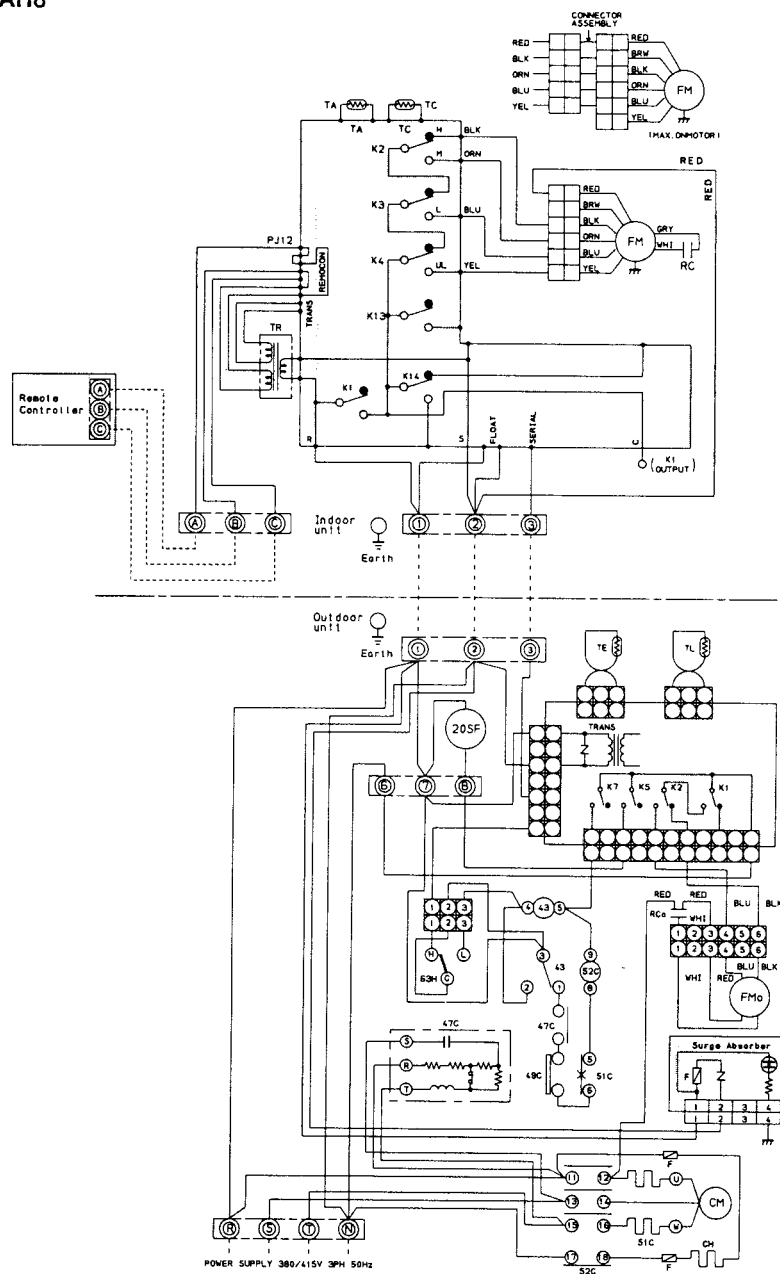


Flexible duct  
RBC-FD202E



### 3. WIRING DIAGRAM

RAV-260BH/260AH8

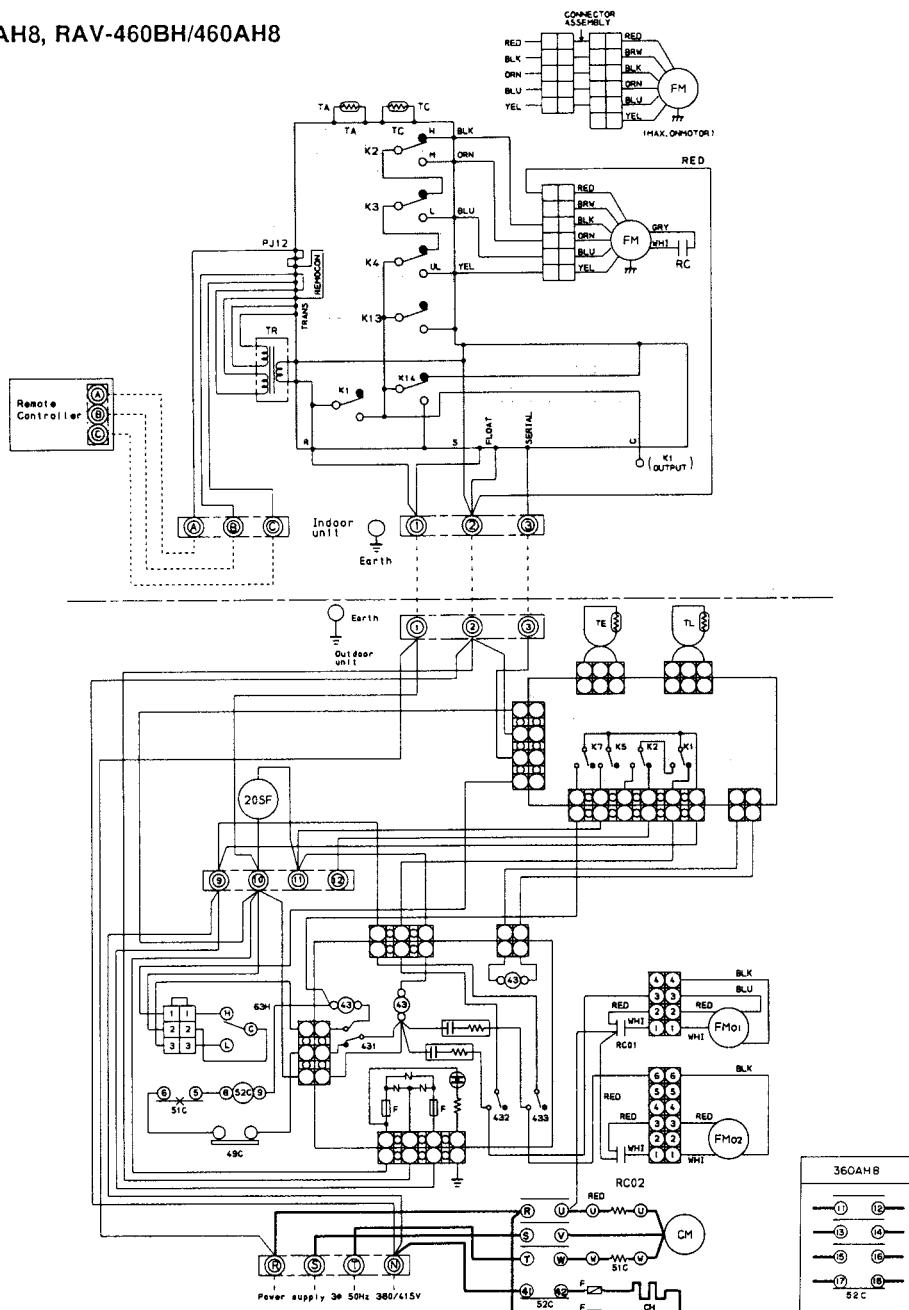


1. ©Shows terminal block and figures show terminal numbers. Broken lines show wiring at site.
2. When the phase of power supply doesn't coincide with a compressor a return lock works and a compressor doesn't run in this case, interchange the phase connection R and T.

Don't operate the units with the magnetic contactor pushed.

Symbol	Name	Symbol	Name	Symbol	Name
20SF	Solenoid Coil (4way valve)	TA	Sensor	TE	Sensor
K <sub>1</sub> ~K <sub>14</sub>	Relay	CM	Compressor	F	Fuse
49C	Thermostat	52C	Magnetic Contactor	RCo	Running Capacitor
51C	Overload Relay	43	Relay	TC	Sensor
47C	Return Lock	63H	High Pressure Switch		
FM	Fan Motor	CH	Crank Case Heater		
RC	Running Capacitor	FMo	Fan Motor		
TR	Transformer	TL	Sensor		

# RAV-360BH/360AH8, RAV-460BH/460AH8



© Shows terminal block and figures show terminal numbers.  
Broken lines show wiring at site.

Don't operate the units with the magnetic contactor pushed.

Symbol	Name	Symbol	Name	Symbol	Name
20SF	Solenoid Coil	52C	Magnetic Contactor	K <sub>1~14</sub>	Relay
K <sub>1~K<sub>7</sub></sub>	Relay	FM <sub>C1, C2</sub>	Fan Motor (Outdoor)	TC	Sensor
49C	Inner Overload Relay	TL	Sensor	TA	Sensor
51C	Overload Relay	TE	Sensor		
43 <sub>1~3</sub>	Relay (Outdoor)	F	Fuse		
63H	High Pressure Switch	FM	Fan Motor		
CH	Crank Case Heater	RC	Running Capacitor		
CM	Compressor	TR	Transformer		

## 4. SPECIFICATIONS OF ELECTRICAL PARTS

### 4.1 RAV-260BH/260AH8

NO.	PARTS NAME	TYPE	SPECIFICATIONS						
1	Indoor unit fan motor	STF-200-100-4B	Output (Rated) 100W, 4 pole, 1 phase, 230V, 50Hz						
2	Running capacitor for indoor fan motor	EAG40M505UF	AC400V, 5 $\mu$ F						
3	Transformer	FT12	187~264V						
4	Relay	LY2F	AC240V, 2ab						
5	Sensor for room temperature		Maximum input 450mW	°C	15	20	25	30	40
				k $\Omega$	16.1	12.6	10.0	8.0	5.2
6	Indoor unit sensor for heat-exchanger temp.	DTN-C103J40	Maximum input 34mA	°C	- 12	0	25	50	
				k $\Omega$	62.29	32.82	10.0	3.59	
7	Compressor	YH330X3-MS	Output (Rated) 2.2kW, 2pole, 3phase, 380/415V, 50Hz						
8	Outdoor unit fan motor	AF-230-63P	Output (Rated) 63W, 6pole, 1phase, 230V, 50Hz						
9	Running capacitor for outdoor fan motor	EEP2G405HQA114	AC400V, 4 $\mu$ F						
10	Magnetic contactor	ME-20F-FS	AC230V, 50Hz (7.5A)						
11	High pressure switch	HTB-T317	Tripping pressure 30 kg/cm <sup>2</sup> G Resetting pressure 23 kg/cm <sup>2</sup> G						
12	Solenoid coil	LB10018	AC240V, 50/60Hz						
13	Crankcase heater		AC240V, 28W						
14	Sensor for defrosting		Maximum input 15.5mA	°C	- 12		10		
				k $\Omega$	67.5		21.3		
15	Overcurrent relay	RC4-20RSI	Tripping current 7.5A, Resetting manual.						
16	Fuse		3A						
17	Sensor for cooling operation in low ambient temperature		Maximum input 34mA	°C	- 12	0	25	50	
				k $\Omega$	62.29	32.82	10.0	3.59	
18	Inner overload relay	CS-7	Tripping temperature 120°C Resetting temperature 90°C						
19	Return lock	STR-4AB	AC400/440V						

#### 4.2. RAV-360BH/360AH8

NO.	PARTS NAME	TYPE	SPECIFICATIONS						
1	Indoor unit fan motor	STF-200-120-4B	Output (Rated) 120W, 4 pole, 1 phase, 230V, 50Hz						
2	Running capacitor for indoor fan motor	EAG40M505UF	AC400V, 5 $\mu$ F						
3	Transformer	FT12	187~264V						
4	Relay	LY2F	AC240V, 2ab						
5	Sensor for room temperature		Maximum input 450mW	°C	15	20	25	30	40
				k $\Omega$	16.1	12.6	10.0	8.0	5.2
6	Indoor unit sensor for heat-exchanger temp.		Maximum input 34mA	°C	- 12	0	25	50	
				k $\Omega$	62.29	32.82	10.0	3.59	
7	Compressor	YH406JA	Output (Rated) 3.0kW, 2pole, 3phase, 380/415V, 50Hz						
			Winding resistance 2.88 $\Omega$ , at 20°C						
8	Outdoor unit fan motor	AF-230-63N	Output (Rated) 63W, 6pole, 1phase, 230V, 50Hz						
			Winding resistance ( $\Omega$ , at 20°C)						
		AF-230-39N	Output (Rated) 39W, 6pole, 1phase, 230V, 50Hz						
			Winding resistance ( $\Omega$ , at 20°C)						
9	Running capacitor for outdoor fan motor	EEP2G405HQA114	AC400V, 4 $\mu$ F						
10	Magnetic contactor	E-20F-FS	AC230V, 50Hz						
11	High pressure switch	HTB-T317	Tripping pressure 30 kg/cm <sup>2</sup> G Resetting pressure 23 kg/cm <sup>2</sup> G						
12	Solenoid coil	L27	AC240V						
13	Crankcase heater		AC240V, 58W						
14	Outdoor unit sensor for heat-exchanger temp.		Maximum input 15.5mA	°C	- 12		10		
				k $\Omega$	67.5		21.3		
15	Overcurrent relay	RC4-20RS1	Tripping current 9A, Resetting manual						
16	Fuse		3A						

#### RAV-460BH/460AH8

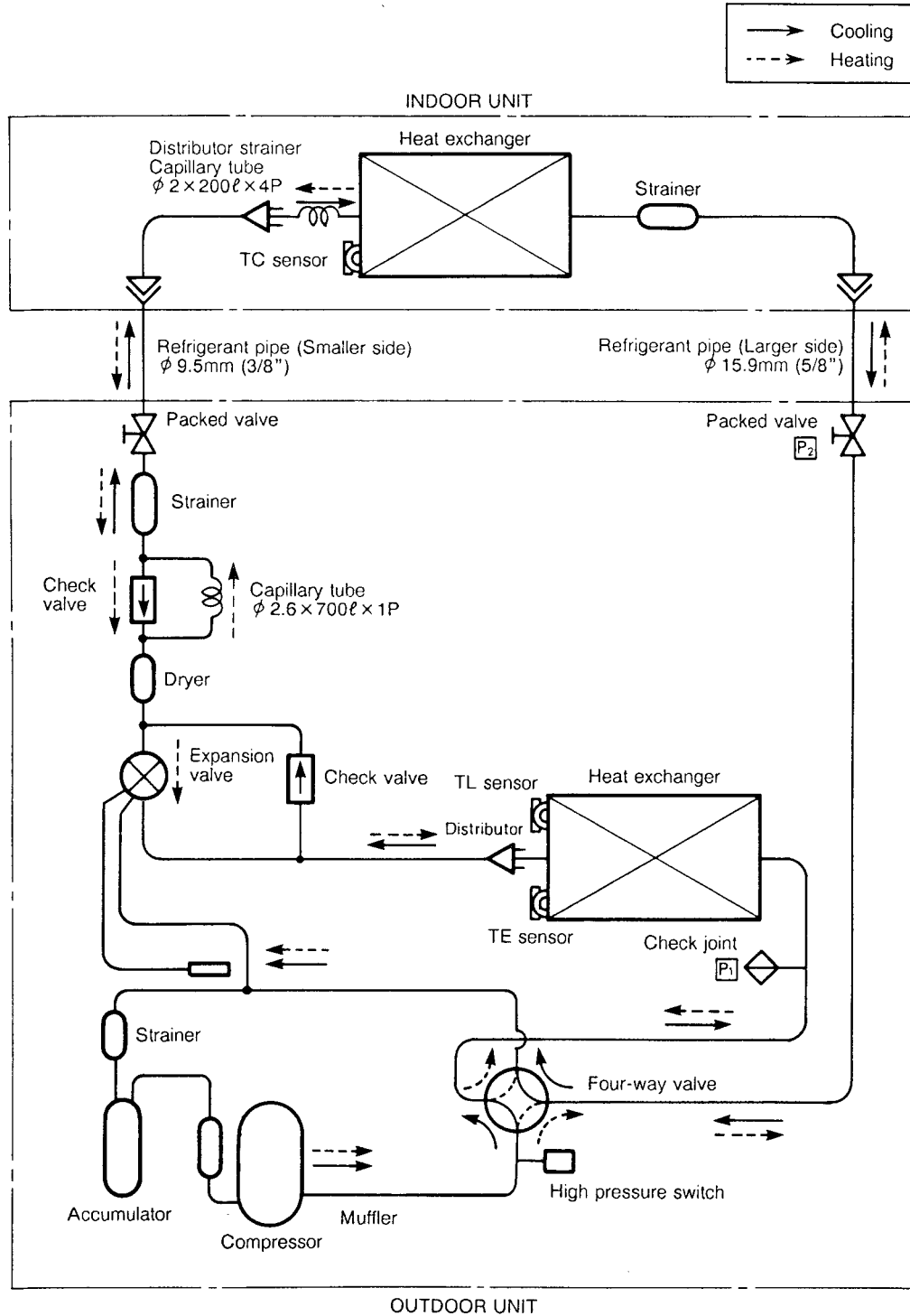
Different points from above model are shown below and other specifications are the same as above.

NO.	PARTS NAME	TYPE	SPECIFICATIONS						
2	Running capacitor for indoor fanmotor	STF-200-140-4F	Output (Rated) 140W, 4 pole, 1 phase, 230V, 50Hz						
7	Compressor	YH506JA	Output (Rated) 3.75kW, 2 pole, 3 phase, 380/415V, 50Hz						
			Winding resistance 2.29 $\Omega$ , at 20°C						
10	Magnetic contactor	C-25	AC230V, 50Hz						
15	Overcurrent relay	RC4-35ER1	Tripping current 12A, Resetting manual						

## 5. REFRIGERANT PIPING DIAGRAM

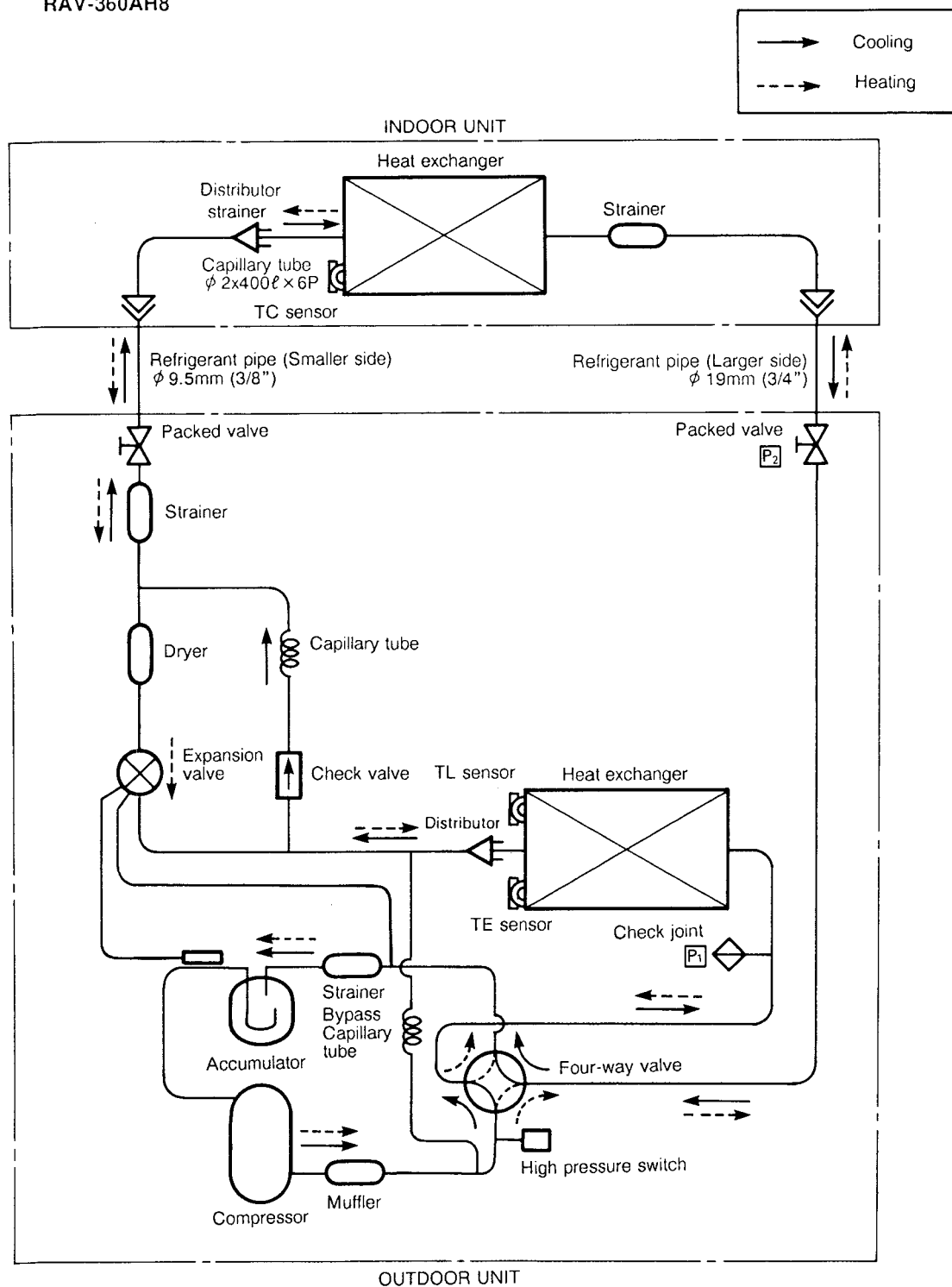
Indoor unit  
RAV-260BH

Outdoor unit  
RAV-260AH8



Indoor unit  
RAV-360BH

Outdoor unit  
RAV-360AH8

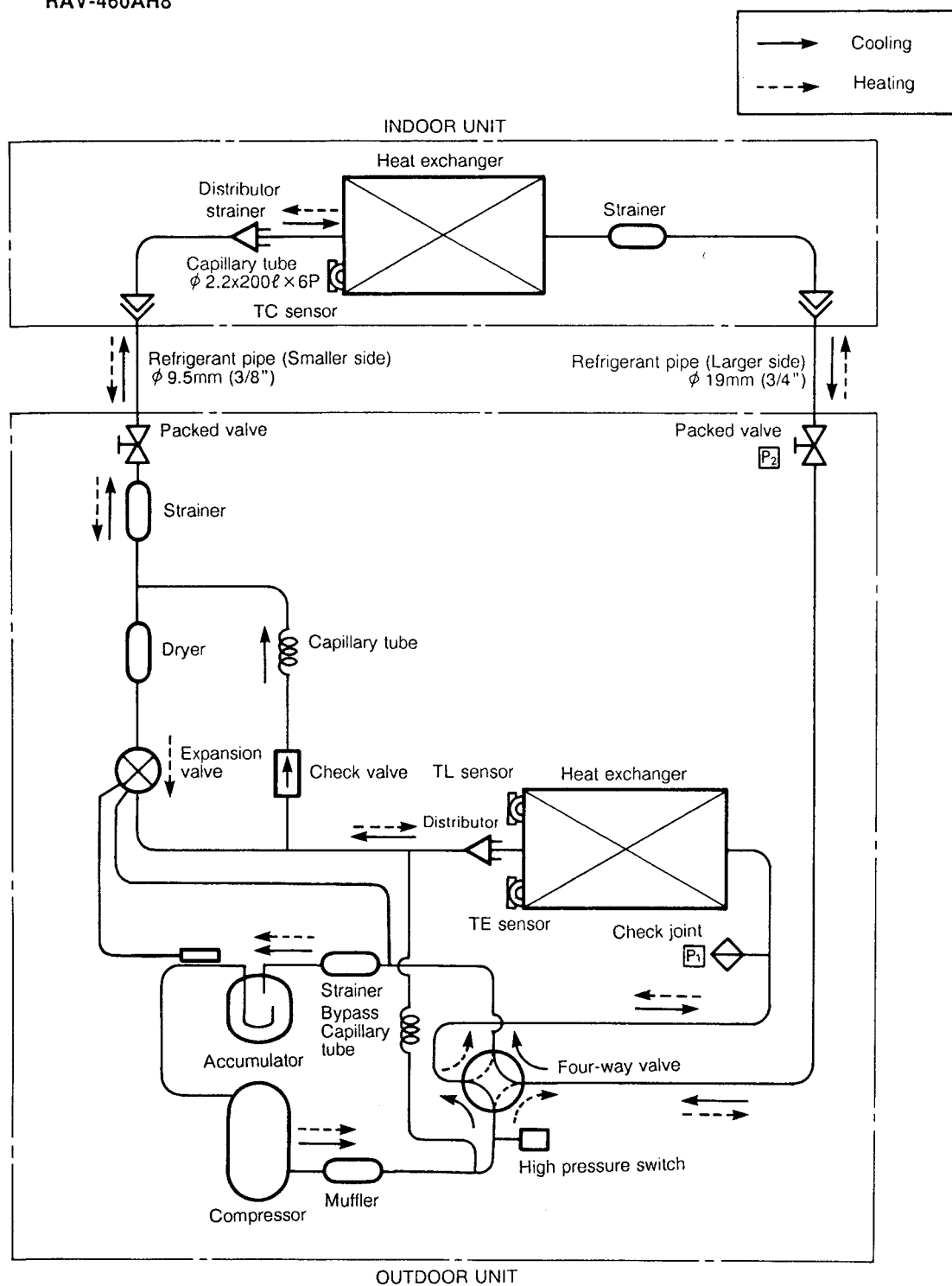


Line Pressure

Model	Capillary tube	Bypass Capillary tube	Line Pressure	
			Cooling	Heating
RAV-360AH8	ID φ 2.4 × 650ℓ × 1P	ID φ 1.7 × 1,000ℓ × 1P	P <sub>1</sub>	High pressure
			P <sub>2</sub>	Low pressure

Indoor unit  
RAV-460BH

Outdoor unit  
RAV-460AH8



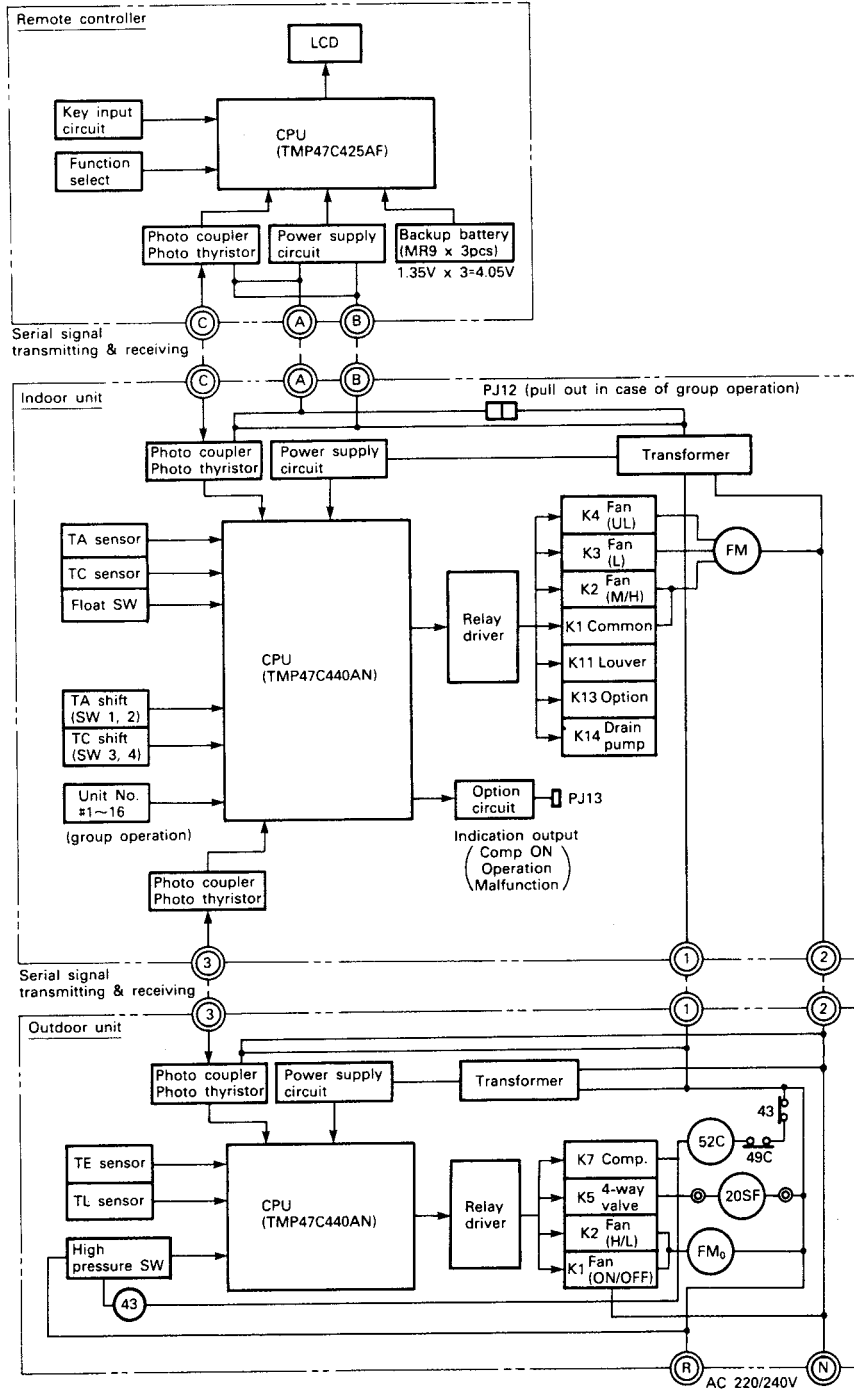
Line Pressure

Model	Capillary tube	Bypass Capillary tube
RAV-460AH8	ID φ 3×600ℓ × 1P	ID φ 2×1,000ℓ × 1P

	Cooling	Heating
P <sub>1</sub>	High pressure	Low pressure
P <sub>2</sub>	Low pressure	High pressure

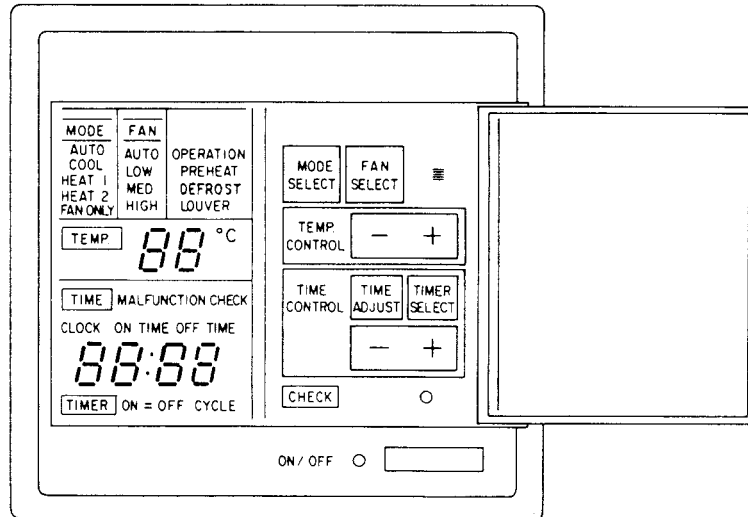


## 6. CONTROL CIRCUIT BLOCK DIAGRAM



## 7. REMOTE CONTROLLER

### 7.1 Remote controller



BUTTON	INDICATOR		OPEATION
ON/OFF		LED (RED)	Run/Stop
MODE SELECT		AUTO COOL HEAT 1 HEAT 2 FAN ONLY	Auto Changeover Cooling Heating Heating (with indoor fan operation at defrost) Fan only
FAN SELECT		AUTO LOW MED HIGH	Auto Fan Speed Control Low Fan Speed Med. Fan Speed High Fan Speed
— — — —		Louver	Auto Louver
TEMP. CONTROL		88 °C °F	Temperature setting
TIME ADJUST		(1) CLOCK (2) ON TIME (3) OFF TIME  88:88	(1) Present Time Adjust (2) ON Time Setting (3) OFF Time Setting
TIMER SELECT		ON OFF ON → OFF ON ← OFF CYCLE	ON Timer OFF Timer ON → OFF Timer OFF ← ON Timer 24H Cycle Timer

NO.	KEY SWITCH	OUTLINE OF SPECIFICATIONS	REMARKS
1	[ON/OFF]	① When this button is pushed once, the air conditioner is turned on, with the operation lamp coming on. ② If pushed once more, it will be turned off, the operation lamp going off. ③ If pushed for 5 sec. in the mode of turning on the air conditioner, goes into test run mode.	Fan operation begins after 30 sec.
2	MORE SELECT	① Each time this button is pushed, the [MODE] setting is changed over cyclically, [AUTO] → [COOL] → [HEAT1] → [HEAT2] → [FAN ONLY] → [AUTO]. ② If pushed continuously, the setting will be changed in one step for every 0.5 sec.	
3	FAN SELECT	① Each time this button is pushed, the [FAN] setting is changed over cyclically, [AUTO] → [LOW] → [MED] → [HIGH] → [AUTO]. ② If pushed continuously, the setting will be changed in one step for every 0.5 sec.	Fan speed
4	([LOUVER]) 	① When this button is pushed once, [LOUVER] indicator comes on. ② If pushed once more, [LOUVER] indicator will go off.	Provided for ceiling type
5	TEMP. CONTROL 	① Each time [+] this button is pushed, the [TEMP] setting of temperature is raised by 1°C. ② If [+] is pushed continuously, the setting will be raised by 1°C every 0.5 sec. ③ Each time [-] button is pushed, the setting of temperature is lowered by 1°C. ④ If [-] is pushed continuously, the setting will be lowered by 1°C every 0.5 sec.	In the 18~29° CL range
6	TIME CONTROL  TIME ADJUST    TIME ADJUST	① Each time [TIME ADJUST] button is pushed, the [TIME] display is changed cyclically. The time can be changed while the TIME display stays flashing. (flashing)         (flashing)         (flashing) [CLOCK] → [CLOCK] → [ON TIME] → [OFF TIME] [12:00]    [12:00]      [6:00]        [18:00] ② While the TIME display stays flashing, the time gains one minute upon each pressing of [+]. ③ If [+] is pushed continuously, the time gains 10 minutes for every 0.25 sec. ④ While the TIME display stays flashing, the time goes back one minute upon each pressing of [-]. ⑤ If [-] is pushed continuously, the time goes back 10 minutes for every 0.25 sec. ⑥ Each time [TIMER SELECT] button is pushed, timer mode change over cyclically, [ ] (CONTINUE) → [ON] → [OFF] → [ON→OFF] → [ON←OFF] → [CYCLE] → [ ]. ⑦ If pushed continuously, the timer mode will be changed in one stop for every 0.5 sec.	If time is not set, 12:00 6:00 18:00 are set automatically.  The digit of 1 min. becomes 0.  The digit of 1 min. becomes 0.
7	CHECK	① PRESSING THIS KEY FOR 0.5 sec. provides [MALFUNCTION CHECK], indicating on liquid crystal the contents of inspection in the sequence of (times of compressor-on) → (contents of malfunction for #1 unit) → (contents of malfunction for #2 unit) →.... ② Pressing this key for 5 sec. gives "Indoor microcomputer reset mode" to reset the indoor microcomputer by way of hardware. ③ Pressing this key for 10 sec. gives "Check contents clear mode" to clear the contents of inspection stored in the remote controller provided, however, that times of compressor-on is not cleared.	The indication of the indoor unit which has not any malfunction content is skipped.
8	Reset	① By pressing the reset key, the remote controller is reset by way of hardware. (The setting/display are in initial values with the check memory cleared.)	

### 7.3 Timer operation

Continuous operation and timer operations are available. The setting of timer operation can be done as follows:

ON, OFF, ON → OFF, OFF → ON, ON ↔ OFF CYCLE.

#### 7.3.1 Time display

The present time is always displayed

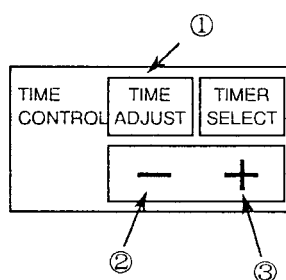
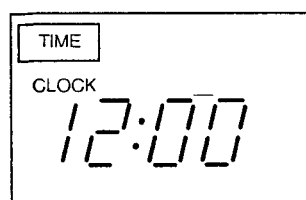
The display of the ON/OFF time is only in setting the time.

Once set, it will not changed even after carrying out the timer operation until the timer is reset.

Initial set time	The present time	12:00
	The time of ON	6:00
	The time of OFF	18:00

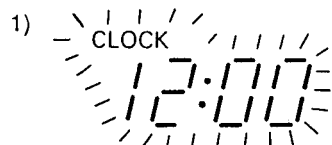
#### 7.3.2 How to set the time

Liquid crystal



As to (-) and (+), change takes place by one minute by pressing once and 10 min./0.25 sec. by pressing continuously.

##### How to set the present time



[TIME ADJUST] switch is pressed.  
[CLOCK] and Time figures flash.

- 2) Time is set by Time setting switch (-) or (+). The setting is finished when releasing. Pressing [TIME ADJUST] three times gives the display of the present time.  
(If left as it is, after 15 sec. the display will go back to the present time).

##### How to set ON TIME



[TIME ADJUST] switch is pressed twice.  
[ON TIME] and Time figures flash.

- 2) Time is set by Time setting switch (-) or (+). The setting is finished when releasing. Pressing [TIME ADJUST] twice gives the display of the present time.  
(If left as it is, after 15 sec. the display will go back to the present time).

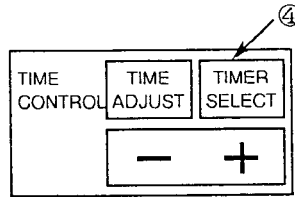
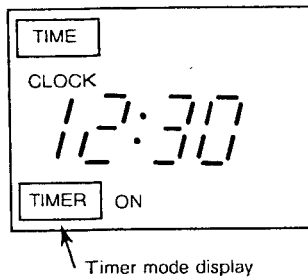
##### How to set OFF TIME



[TIME ADJUST] switch is pressed three times.  
[OFF TIME] and Time figures flash.

- 2) Time is set by Time setting switch (-) or (+). The setting is finished when releasing. Pressing [TIME ADJUST] twice gives the display of the present time.  
(If left as it is, after 15 sec. the display will go back to the present time).

### 7.3.3 How to set the timer operation



The following can be chosen sequentially by pressing [TIMER SELECT] switch:

- 1) [TIMER] ON
- 2) [TIMER] OFF
- 3) [TIMER] ON → OFF
- 4) [TIMER] ON ← OFF
- 5) [TIMER] CYCLE

- \* Be sure to set the present time.
- \* In case of reoperating after finishing timer operation, if [TIMER SELECT] is not altered, the timer operation will be performed again.

#### Timer ON operation

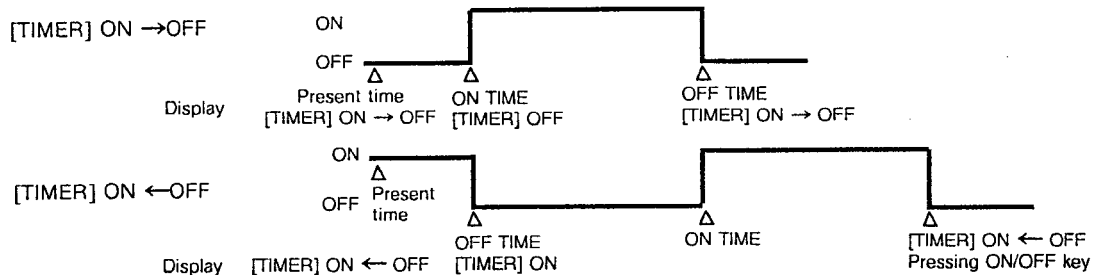
- 1) [TIMER] ON is applied.
- 2) ON/OFF key is pressed. Then LED is lighted.
- When the set [ON TIME] comes, the operation starts and OPERATION display comes on the liquid crystal, and the [TIMER] ON display goes off.
- 3) LED and OPERATION display goes off upon pressing ON/OFF key for stopping and [TIMER] ON is displayed.

#### Timer OFF operation

- 1) [TIMER] OFF is applied.
- 2) ON/OFF key is pressed. Then LED is lighted and the operation starts with OPERATION displayed on the liquid crystal.
- 3) When the set [OFF TIME] comes, the operation stops and the LED, OPERATION display goes off with [TIMER] OFF displayed.

#### ON ↔ OFF timer operation

- 1) [TIMER] ON → OFF or [TIMER] ON ← OFF is applied.
- 2) ON/OFF key is pressed. LED comes on and the operation is performed as below:

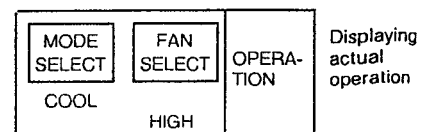


#### Repeated operation

- 1) [TIMER] CYCLE is applied.
- 2) ON/OFF key is pressed. Then LED is lighted and ON ↔ OFF timer operation is repeated according to the ON time and OFF time (repeating every day as it is a 24-hour timer).
- 3) The operation key is pressed. LED goes off and operation stops.

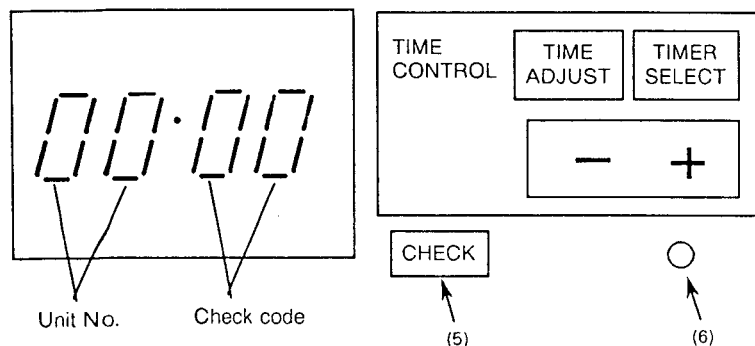
#### Timer stand-by display and operation display

Waiting on the timer is displayed by LED lighting while the actual operation is displayed on OPERATION on liquid crystal.



## 7.4 Malfunction check monitor

7.4.1 The times of thermostat ON as well as the check code are displayed on the time display area by pressing CHECK key.



(5) Check key

Provides check code display by pressing for one second and indoor microcomputer reset by pressing for 5 seconds.

\* Remote controller clear by pressing the key for 10 sec. Check code is cleared (normally not used).

(6) Reset key (pushed by a needle and the like) Resetting remote controller (to the initial setting)

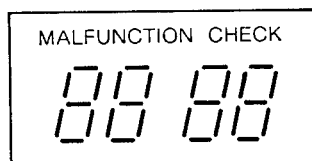
### Judgement from operation status

	OPERATION STATUS	CODE	CAUSE
1.	Thermostat stays off in cooling: it is not turned off in heating	0C	Open-circuit in room temperature sensor.
	Thermostat stays off in heating: it is not turned off in cooling		Short-circuit in room temperature sensor.
2.	Indoor fan stays off in heating	0d	Open-circuit in indoor heat-exchanger sensor.
	Outdoor fan continues ON-OFF operation in heating.		Short-circuit in indoor heat-exchanger sensor.
3.	While indoor unit is in operation, outdoor unit keeps on stoppage Neon lamp comes on.	0b	Abnormality in drain system. Fault of drain pump. Drain pipe clogged.
4.	Though indoor unit operates, outdoor unit keeps on stopping.	04	Abnormality in connecting cable between indoor and outdoor units.
5.	Indoor fan does not work in heating operation. Warm air comes out in cooling operation.	08	4-way valve coil burnt out, pipe clogged, abnormality in indoor heat-exchanger sensor.
6.	Indoor fan at LOW speed in cooling operation with the outdoor remaining in stoppage.	09	Refrigerant gas in shortage. Abnormality in indoor heat-exchanger sensor.
7.	Full stop	18	Open or short-circuit in outdoor TE sensor.
8.	Full stop	19	Open or short-circuit in outdoor TL sensor.
9.	Full stop	21	Pressure switch does not reset within the set time.
10.	Full stop	1C	Pressure switch, overcurrent sensor operated.
11.	Indoor unit does not operate at all.	99	Abnormality in connecting cable between remote controller and indoor units.

## 7.4.2 How to read malfunction check monitor display

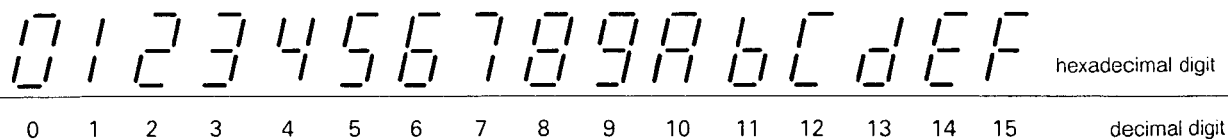
By pressing [CHECK] key, times of No.1 unit compressor-ON actuations as well as the check code information of 2 faults × 16 units are displayed on the time display area. (2 sec. per one phenomenon)

< Times of compressor-ON >

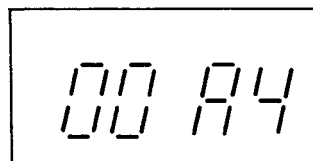


Display in 4 digits of hexadecimal notation

Display in 7 segments

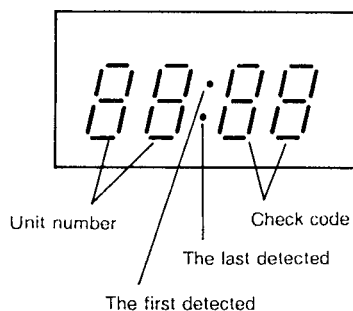


Ex. In case of the number of times of compressor actuations of 164.



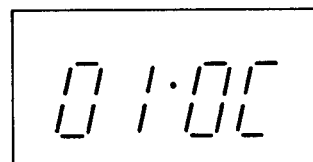
$$16^3 \times 0 + 16^2 \times 0 + 16 \times 10 + 4 = 164$$

< Check code information >

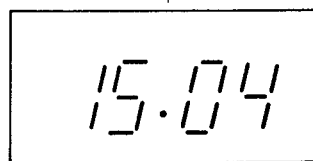
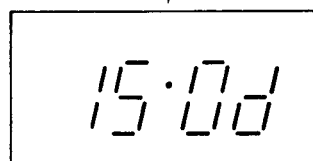
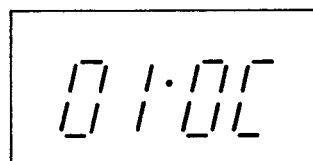


No display is made if there is no fault.

Ex. In case of room temperature sensor of No.1 unit in trouble.



For No.15 unit, firstly room temperature sensor and secondly connecting cable between the indoor and outdoor units (serial signal) are in trouble.



### 7.4.3 List of Check Code

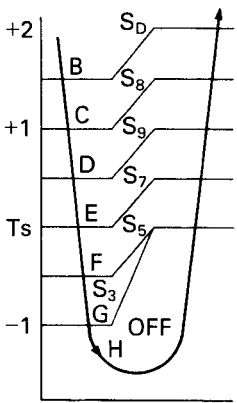
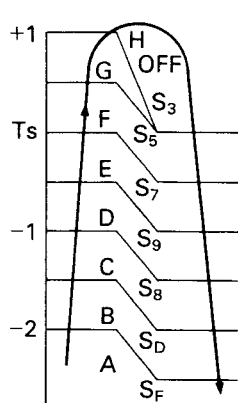
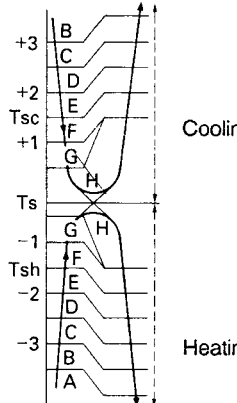
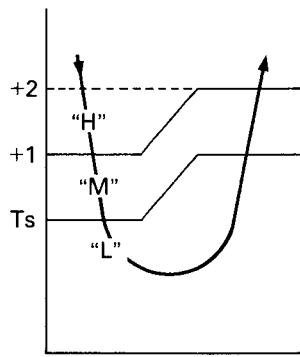
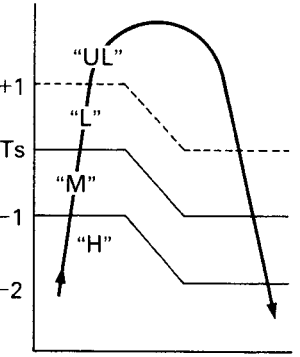
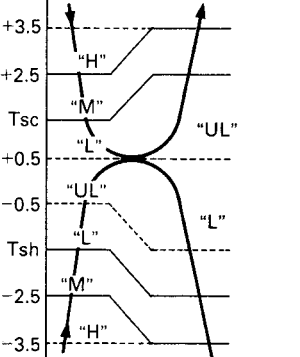
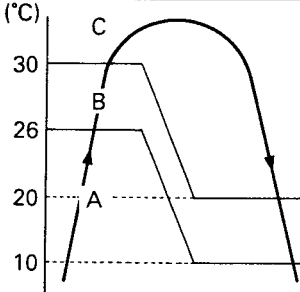
DIAGNOSTIC FUNCTIONS			JUDGEMENT AND ACTION
CHECK CODE	SYMPTOM	STATUS OF AIR CONDITIONER	
01	<div>ROOM TEMP. SENSOR (TA).</div> <p>Out of place, break, short-circuit.</p>	Operation continuing	<ol style="list-style-type: none"> <li>1. Check for indoor temp. sensor.</li> <li>2. Check for indoor PC board.</li> </ol>
02	<div>INDOOR HEAT-EXCHANGER SENSOR (TC).</div> <p>Out of place, break, short-circuit.</p>	Operation continuing	<ol style="list-style-type: none"> <li>1. Check for indoor heat-exchanger sensor.</li> <li>2. Check for indoor PC board.</li> </ol>
06	<div>FLOAT SWITCH</div> <p>float circuit out of position, break.</p>	Outdoor unit stops	<ol style="list-style-type: none"> <li>1. Fault in drain pump.</li> <li>2. Drain pipe clogged.</li> <li>3. Check for indoor PC board.</li> </ol>
04	<div>RETURN SIGNAL NOT COMING TO INDOOR</div> <p>1) Wrong wiring in connecting cable (serial signal).</p>	Operation continuing	<ol style="list-style-type: none"> <li>1. If outdoor unit does not work at all.               <ol style="list-style-type: none"> <li>(1) Check for connecting cable correct wrong wiring.</li> <li>(2) Check for outdoor PC board.</li> </ol> </li> <li>2. If operates normally. Between indoor terminal plates 2 and 3, return signal is : Available: Check for indoor PC board. Not available: Check for outdoor PC board.</li> </ol>
03	<div>4-WAY VALVE SYSTEM</div> <p>1) Indoor heat-exchanger temperature rises, after starting cooling operation. 2) Indoor heat-exchanger temperature drops after starting heating operation.</p>	Operation continuing	<ol style="list-style-type: none"> <li>1. Check for 4-way valve.</li> <li>2. Check for 2-way valve and check valve.</li> <li>3. Wrong with indoor heat exchanger sensor.</li> <li>4. Check for indoor PC board.</li> </ol>
09	<div>OTHER CYCLE SYSTEM</div> <p>1) Indoor heat exchange temperature does change after starting cooling/heating operation. 2) When transmitting instruction for stopping compressor by freeze preventing control.</p>	Operation continuing	<ol style="list-style-type: none"> <li>1. Compressor case thermostat, IOL operation. (contactor OFF, compressor stops)</li> <li>2. Indoor heat-exchange sensor out of place.</li> <li>3. Check for indoor PC board.</li> </ol>
		Outdoor unit stops (indoor fan L)	<ol style="list-style-type: none"> <li>1. Check for charged amount of refrigerant gas. (Gas shortage → gas supplement, check for gas leaks)</li> <li>2. Indoor fan locked.</li> </ol>

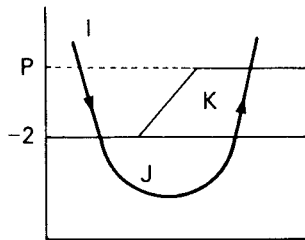
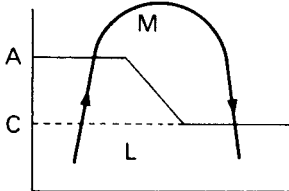


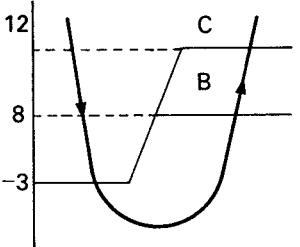
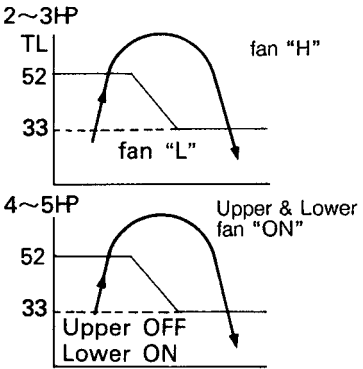

18	<div>DEFROST SENSOR (TE)</div> <p>Out of place, break, short-circuit.</p>	Full stop	<ol style="list-style-type: none"> <li>1. Check for defrosting sensor.</li> <li>2. Check for outdoor PC board.</li> </ol>
19	<div>OUTDOOR HEAT-EXCHANGER SENSOR (TL)</div> <p>Out of place, break, short-circuit.</p>	Full stop	<ol style="list-style-type: none"> <li>1. Check for outdoor heat-exchanger sensor.</li> <li>2. Check for outdoor PC board.</li> </ol>
21	<div>HIGH PRESSURE SWITCH</div> <p>High pressure switch does not reset. ( 5 sec : in cooling ) ( 30 sec : in heating )</p>	Full stop	<ol style="list-style-type: none"> <li>1. Check for high pressure switch.</li> <li>2. Check for outdoor PC board.</li> </ol>
11	<div>OTHER ABNORMALITY OF OUTDOOR UNIT</div> <p>Compressor does not operate. Start once, but soon after stop by OCR.</p>	Full stop	<ol style="list-style-type: none"> <li>1. Check for compressor.</li> <li>2. Check for wiring of compressor. (lack of phase, short circuit)</li> <li>3. Check for voltage.</li> <li>4. Check for outdoor PC board.</li> </ol>
99	<div>WRONG WIRING OF REMOTE CONTROL UNIT</div> <p>Indoor unit does not operate at all.</p>	Full stop	<ol style="list-style-type: none"> <li>1. Check for wiring between remote control unit and indoor unit.</li> <li>2. Check for indoor unit PC board.</li> </ol>

## 8. OUTLINE OF CONTROL CIRCUIT

NO.	ITEM	OUTLINE OF SPECIFICATIONS	REMARKS																		
1	Discrimination	Discrimination of outdoor unit is performed either in the reset of power source or when stopping from operating condition, and the controlling is changed over in accordance with the result of discrimination. [Heating S1] is used as the discriminating signal, [Inverter heat pump], [Normal heat pump], and [Cooling only] being discriminated according to the contents of reverse signal from the outdoor unit.																			
2	Operation change-over	<p>Operation mode is changed over according to operation mode select instruction from the remote controller.</p> <table><tr><th>REMOTE CONTROLLER INSTRUCTION</th><th>OUTLINE OF CONTROL</th></tr><tr><td>Stop</td><td>Stopping air conditioner</td></tr><tr><td>Auto</td><td>Performing automatic change-over</td></tr><tr><td>Cool</td><td>Performing cooling operation</td></tr><tr><td>Heat 1</td><td>Performing heating operation</td></tr><tr><td>Heat 2</td><td>Performing heating operation with indoor fan operation at defrosting</td></tr><tr><td>Fan only</td><td>Performing fan only operation</td></tr></table>	REMOTE CONTROLLER INSTRUCTION	OUTLINE OF CONTROL	Stop	Stopping air conditioner	Auto	Performing automatic change-over	Cool	Performing cooling operation	Heat 1	Performing heating operation	Heat 2	Performing heating operation with indoor fan operation at defrosting	Fan only	Performing fan only operation					
REMOTE CONTROLLER INSTRUCTION	OUTLINE OF CONTROL																				
Stop	Stopping air conditioner																				
Auto	Performing automatic change-over																				
Cool	Performing cooling operation																				
Heat 1	Performing heating operation																				
Heat 2	Performing heating operation with indoor fan operation at defrosting																				
Fan only	Performing fan only operation																				
3	Controlling room temperature	<p>3-1 Adjusting range (°C)</p> <table><tr><td></td><td>In cooling</td><td>In heating</td></tr><tr><td>Remote controller setting temperature</td><td>18 ~ 29</td><td>18 ~ 29</td></tr><tr><td>Operating temperature</td><td>18 ~ 29</td><td>20 ~ 31</td></tr></table> <p>3-2 Operating point is compressor - off. 3-3 Operating temperature accuracy: ±1°C. 3-4 Differential: 1 deg</p>		In cooling	In heating	Remote controller setting temperature	18 ~ 29	18 ~ 29	Operating temperature	18 ~ 29	20 ~ 31										
	In cooling	In heating																			
Remote controller setting temperature	18 ~ 29	18 ~ 29																			
Operating temperature	18 ~ 29	20 ~ 31																			
	Correcting temperature compensation	<p>3-5 Room temperature controlled in the heating operation can be corrected by dip switch of indoor microcomputer.</p> <table><tr><td>Dip switch</td><td>1</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>Setting</td><td>2</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td></tr><tr><td>Control temperature compensation</td><td></td><td>0deg</td><td>2deg</td><td>4deg</td><td>6deg</td></tr></table>	Dip switch	1	ON	ON	OFF	OFF	Setting	2	ON	OFF	ON	OFF	Control temperature compensation		0deg	2deg	4deg	6deg	Ts(Max) = 35°C
Dip switch	1	ON	ON	OFF	OFF																
Setting	2	ON	OFF	ON	OFF																
Control temperature compensation		0deg	2deg	4deg	6deg																
4	Automatic capacity control (Thermo-control)	<p>4-1 Instruction of operation frequency is given to outdoor unit based on the table below according to the difference between Ta and Ts.</p> <p>4-2 Compressor is turned on at the frequency instruction of [S3] or higher, and turned off below [S3].</p>																			

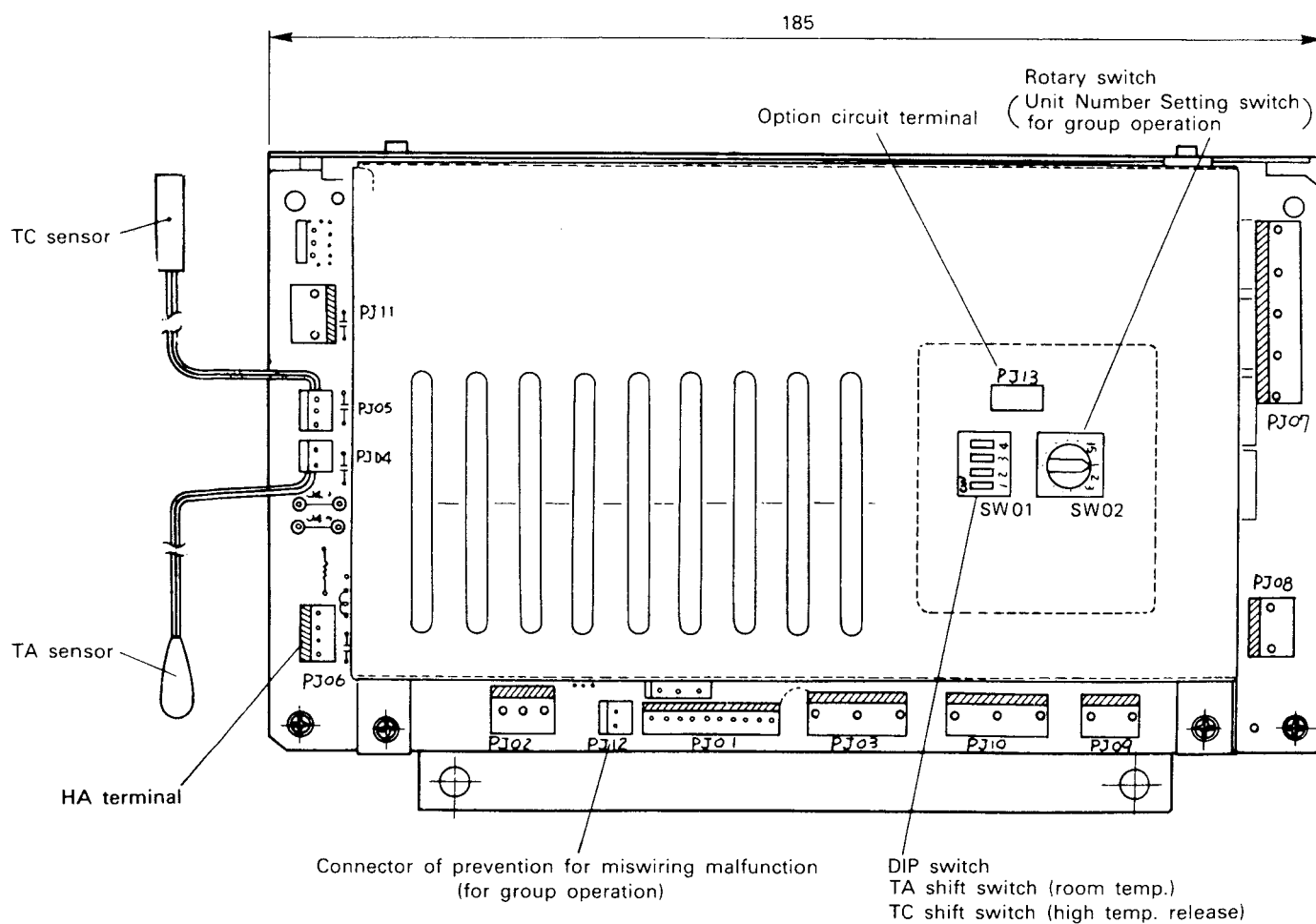
NO.	ITEM	OUTLINE OF SPECIFICATIONS	REMARKS
		<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>- Cooling -</p>  </div> <div style="text-align: center;"> <p>- Heating -</p>  </div> <div style="text-align: center;"> <p>- Auto-changeover -</p>  </div> </div>	
5	Fan speed control	<p>5-1 [HIGH], [MED], [LOW] and [AUTO] are available.</p> <p>5-2 [Ultra low] or [Stop] when thermostat is turned off while heating is being performed.</p> <p>5-3 In the auto fan, the fan speed is changed by the difference between <math>T_a</math> and <math>T_s</math>, as shown below.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>- Cooling -</p>  </div> <div style="text-align: center;"> <p>- Heating -</p>  </div> <div style="text-align: center;"> <p>- Auto-changeover -</p>  </div> </div>	[Stop] is cold draft prevention by $T_c$ .
6	Cold draft preventing control	<p>When performing heating operation, indoor fan control is carried out as follows based on temperature detection of <math>T_c</math> sensor.</p> <p>C zone: Depending upon fan speed setting of the remote controller</p> <p>B zone: Indoor fan at "L"</p> <p>A zone: Fan stop</p> <div style="text-align: center;">  </div>	

NO.	ITEM	OUTLINE OF SPECIFICATIONS	REMARKS																		
7	Freeze preventing control (Low temp. release)	<p>When performing cooling operation, the following control is done based on temperature detection of Tc sensor.</p> <p>① When starting the operation, the point P is made +3°C.</p> <p>② Frequency instructed to the outdoor unit is reduced when [J] zone is detected for 1 minute continuously.</p> <p>③ Frequency instructed to the outdoor unit is reduced each time 2 minutes have elapsed thereafter.</p> <p>④ When [K] zone is detected, timer counting is discontinued and held on.</p> <p>⑤ When [I] zone is detected, timer is cleared for returning back to ordinary operation.</p> <p>⑥ When frequency instructed to the outdoor unit has become H, the point P is changed to +12°C to be covered by check display.</p> <p>When [I] zone is reached, the temperature is returned back to +3°C.</p> 	H = OFF																		
8	High temperature release control	<p>When performing heating operation, the following control is done based on temperature detection of Tc sensor.</p> <p>① In [M] zone, release signal is transmitted.</p> <p>Outdoor fan is turned off at the shortest for 3 minutes based on this signal.</p> <p>② The control point for A and C can be chosen from the below table:</p> <table border="1" data-bbox="517 1321 1143 1467"><tr><td>Dip switch</td><td>3</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>Setting</td><td>4</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td></tr><tr><td>A/C (°C)</td><td></td><td>54/52</td><td>58/56</td><td>60/58</td><td>-</td></tr></table> 	Dip switch	3	ON	ON	OFF	OFF	Setting	4	ON	OFF	ON	OFF	A/C (°C)		54/52	58/56	60/58	-	<p>Interval operation of outdoor upper fan at low is done in the outdoor unit select B mode. (Outdoor fan)</p> <p>B = 4HP, 5HP</p>
Dip switch	3	ON	ON	OFF	OFF																
Setting	4	ON	OFF	ON	OFF																
A/C (°C)		54/52	58/56	60/58	-																
9	Drain pump control	<p>9-1 When [Cooling] operation is performed, drain pump is actuated.</p> <p>9-2 While overflow switch is operated, compressor is turned off and drain pump works.</p> <p>9-3 When overflow switch is operated for a period of 2 minutes, it will become the subject of check display.</p>																			
10	Residual heat removal	When stoppage takes place in [HEAT 2] operation, indoor fan is operated in [LOW] for 30 sec.																			
11	Auto louver control	When receiving louver signal from remote controller, auto louver operation is performed if indoor fan is being in operation.	Provided for ceiling type																		
12	Test operation	<p>12-1 If Remote controller's ON/OFF switch is pressed 5 minutes continuously, the unit goes into test run mode, and fixed-frequency operation is performed with the indoor fan in the [HIGH].</p> <p>12-2 After continuing the operation for 30 minutes, [Fan only] operation is initiated.</p>	Instructed frequency [S7]																		

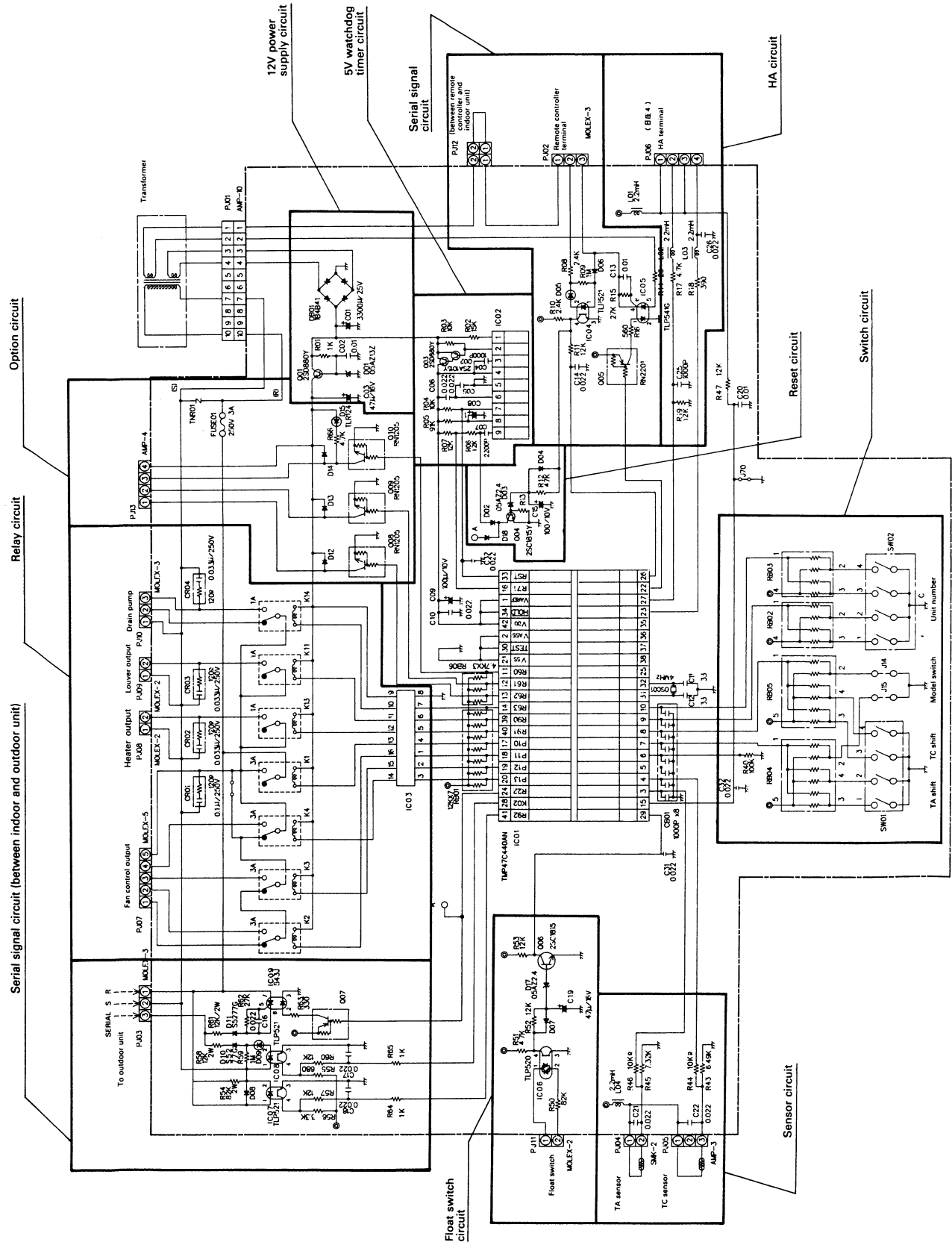
NO.	ITEM	OUTLINE OF SPECIFICATIONS	REMARKS
13	High pressure release	<p>The following control is performed when high pressure switch of the outdoor unit is actuated.</p> <p>① In cooling operation Compressor is turned off and if the high pressure switch does not reset for 5 seconds continuously thereafter, it is judged abnormal.</p> <p>② In heating operation Compressor is turned off and if the high pressure switch does not reset for 30 seconds continuously thereafter, it is judged abnormal. If the switch resets within 30 sec., the compressor restarts 2 minutes and 30 sec. later. And if this process is repeated, the release by outdoor fan and shift of compressor-on point will be done.</p> <p>③ In defrosting operation Compressor is turned off, the operation returning back to heating operation.</p>	< Outdoor unit control > LED lamp comes on in abnormal condition, being abnormal code transmitted to indoor unit.
14	Defrosting	<p>14-1 In heating operation, defrosting is made based on outdoor heat exchange temperature <math>T_e</math>.</p> <p>14-2 When cumulative working time of the compressor in [A] zone has amounted to 55 minutes, defrosting operation starts. (25 minutes initially)</p> <p>14-3 The longest defrosting time is 12 minutes, 60 sec. in the case of turning into [B] zone, and immediate returning back when [C] zone is reached.</p>	
15	Low ambient cooling	<p>15-1 Control on outdoor fan is made to meet with cooling at low outdoor temperature based on outdoor heat exchange temperature TL.</p> <p>15-2 Control by outdoor heat exchange temperature TL is illustrated in the right.</p>	
16	Check display	<p>Fault diagnosis is carried out by check for serial signal transmission and reception with outdoor unit as well as the self check by indoor microcomputer. And check code is transmitted to protective operation/remote controller based on the contents of it.</p> <p>In the remote controller, check code is displayed on the liquid crystal by pressing [CHECK] key.</p>	<p>See other item: Using [TIME] display</p>  <p>Unit NO.      Check code.</p>
17	Anti-restart timer	The outdoor unit delays restarting for 2.5 min. to prevent short cycling compressor operation.	
18	Group operation control	<p>Up to 16 units can be controlled in same setting condition by one remote controller.</p> <p>However, thermo-control function is independent.</p> <p>Respective delayed start time for preventing simultaneous large starting current can be by different setting of the unit No. switch on the indoor PC board.</p>	Refer to P. 38

## 9. DESCRIPTION OF INDOOR UNIT CONTROL CIRCUIT

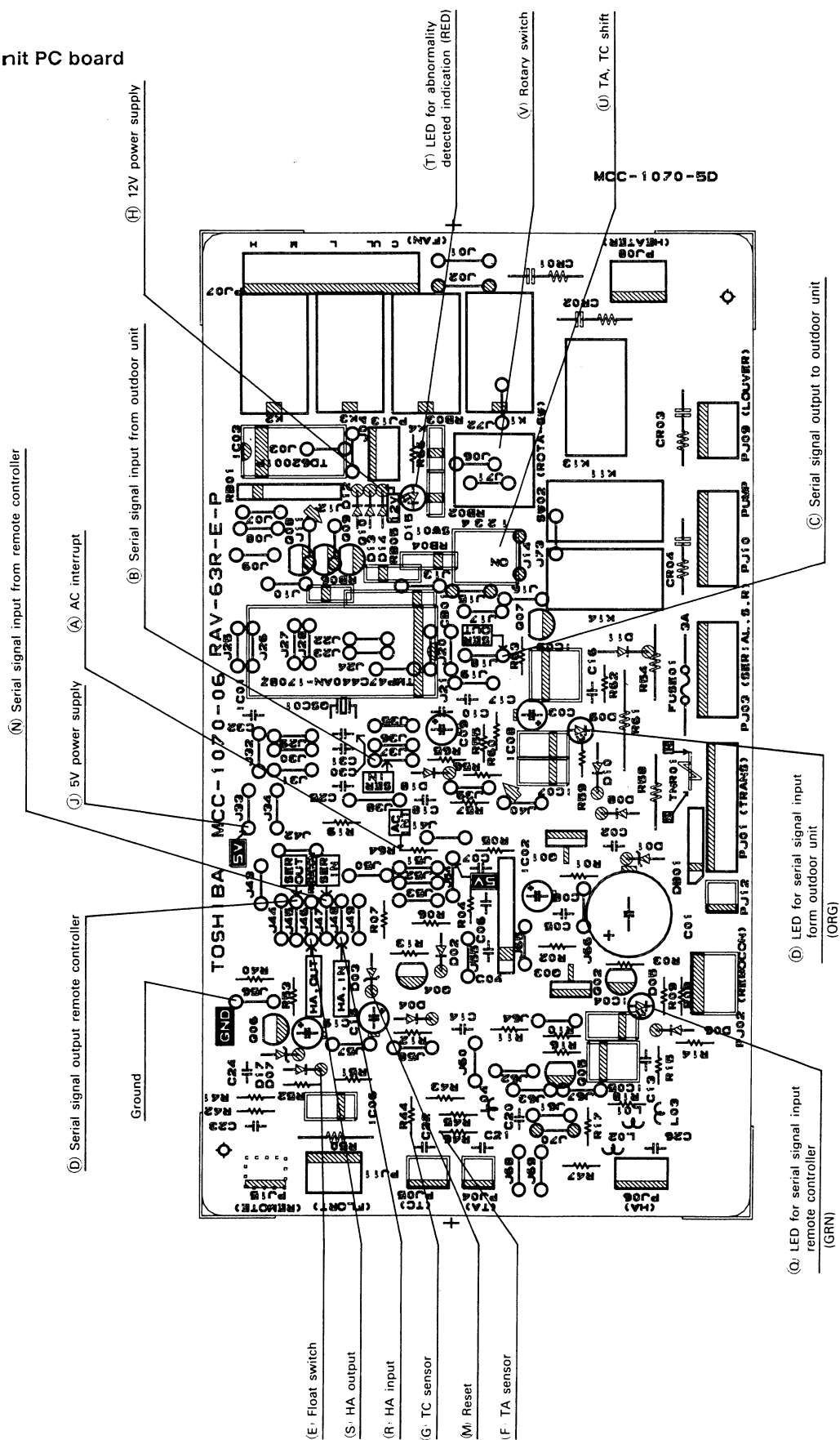
### 9.1 Indoor unit control box



## 9.2 Indoor unit control circuit diagram



### 9.3 Indoor unit PC board

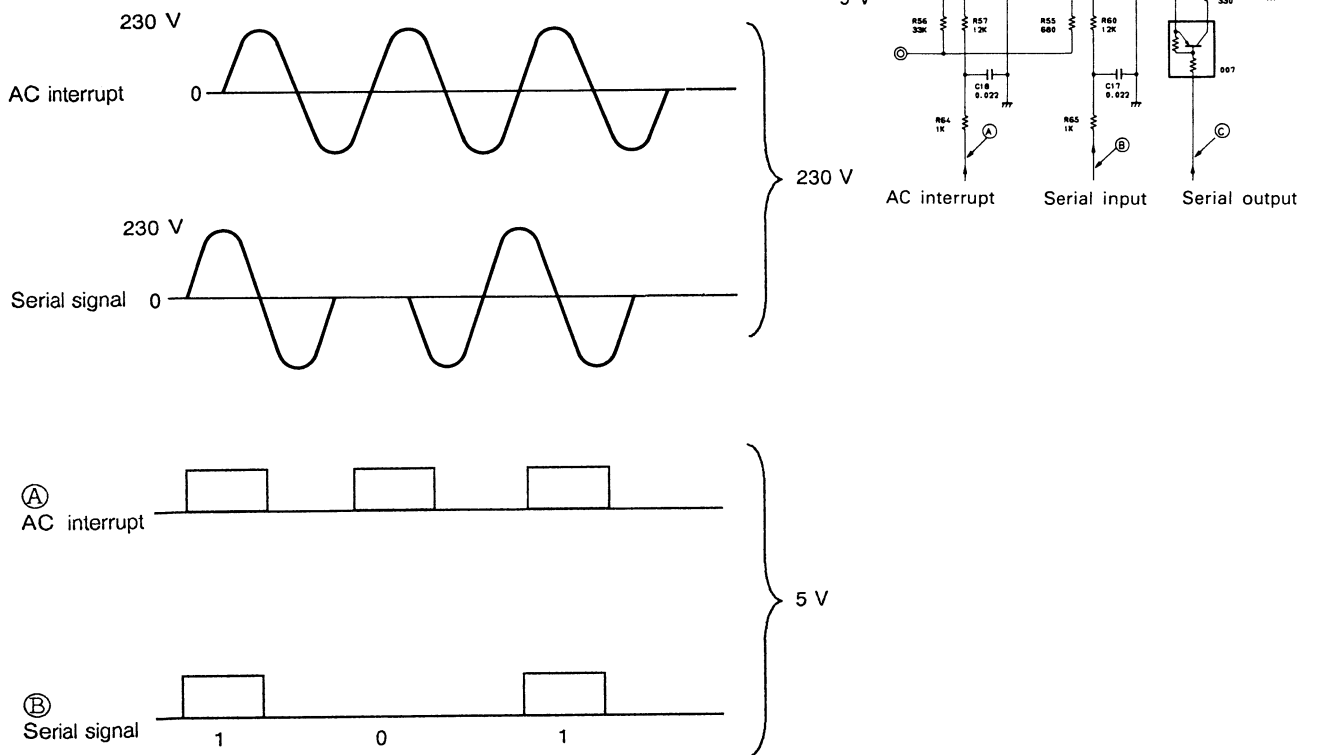




#### 9.4 Serial signal circuit (between outdoor and indoor units)

This is a circuit for transmitting and receiving the signals between the indoor and outdoor units in serial signal. As 230V is used for transmitting the signal, the microcomputer section is insulated by means of photo-coupler with the voltage reduced to 5V.

With AC interrupt, judgement is made as to the presence or absence of serial signal based on the reference pulse taken out from the voltage across R and S.

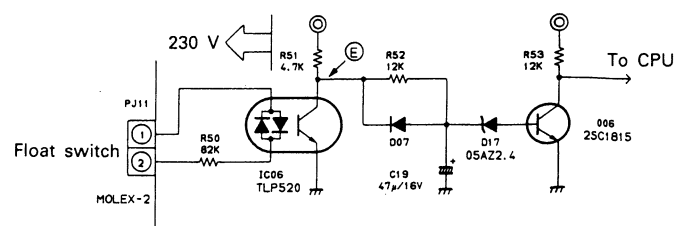


(A)/(B) .... are measurement points on the printed circuit board.

(C) provides flashing (orange) on LED in the serial input.

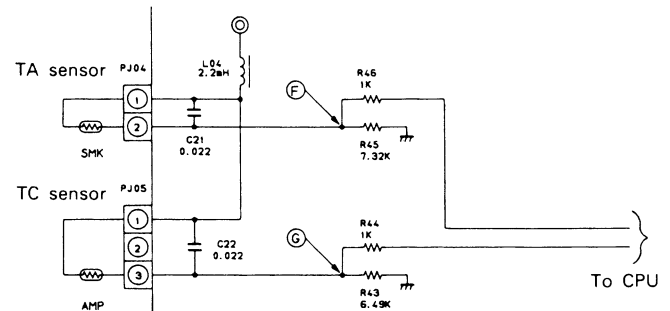
#### 9.5 Float switch circuit

In normal condition in which float switch is not operated, 230V is applied across the pins 1 and 2. At this time, point (E) is at the GND level. If the float switch is operated, (E) will be at the level of 5V.



## 9.6 Sensor circuit

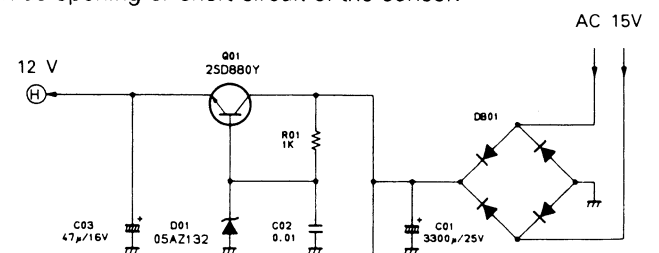
This circuit detects the temperature by dividing voltage with resistance and sensor and bringing the voltage value into CPU, using the characteristics of the sensor that resistance varies with different temperatures. TA and TC have the same circuit composition.



When TA and TC are at 25°C approximately, the voltage level is same 2V both at points (F) and (G).  
If (F) / (G) are at GND or 5V, abnormal condition prevails such as opening or short-circuit of the sensor.

## 9.7 12V power source circuit

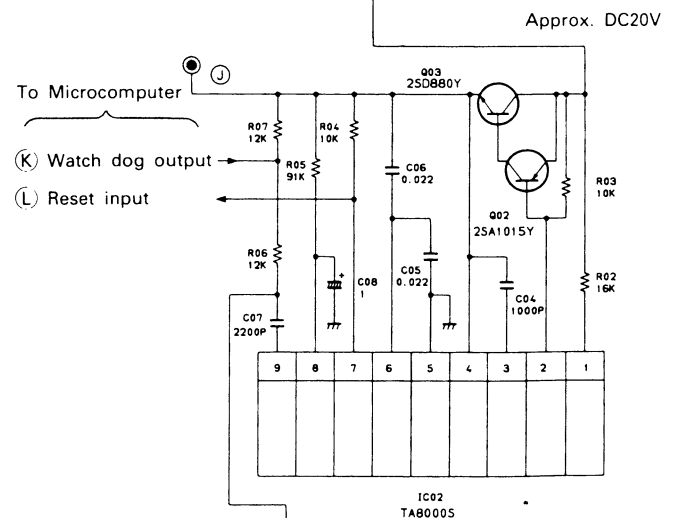
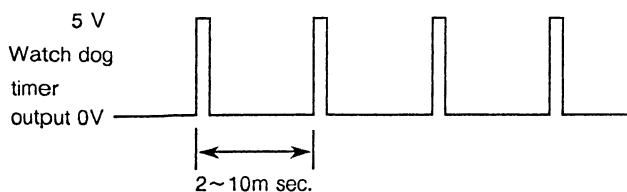
Full-wave rectification by diode bridge (DB01) of alternate current supplied from power transformer followed by the provision of transistor (Q01) gives DC12V power source (H).



## 9.8 5V watchdog timer circuit

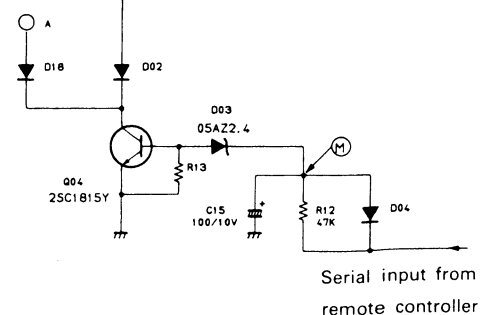
Built-in IC (TA8000S) is used to produce 5V power source (J). Also, it sends signals to reset port (L) of microcomputer which is in stand-by at 0V and starts its operation with the signal of 5V.

Watchdog timer output gives the signal from microcomputer as illustrated below. This indicates that the microcomputer is working in normal routine. For example if the microcomputer is straying due to noise and so on, this waveform is not produced. In case there is no waveform, it plays the role of restoring normal condition by inputting the resetting "0V" to the microcomputer.



## 9.9 Reset circuit

This circuit makes indoor microcomputer reset by way of hardware when you keeps on pressing the check key of remote controller for longer than a predetermined period. It plays the role of resetting microcomputer from the remote controller when it strays. The point (M), which is normally at the level of 5V, drops down to the GND level in the reset operation.

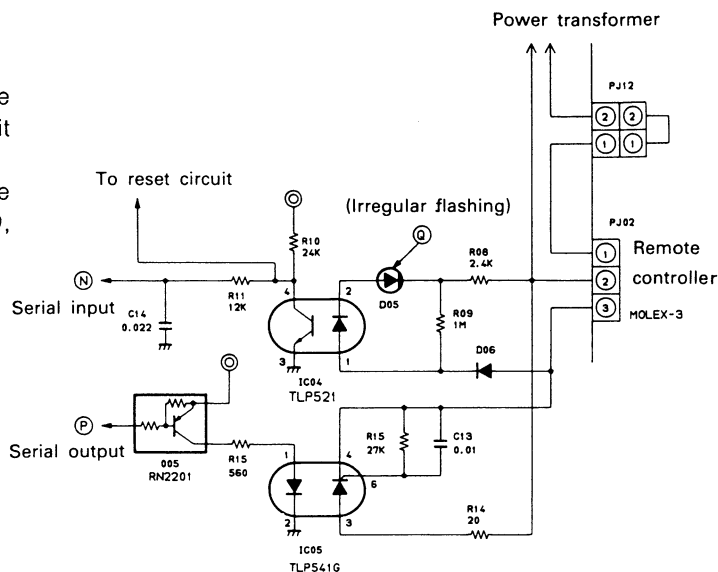
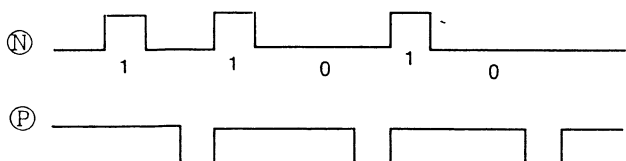


## 9.10 Serial signal circuit

### (Between remote controller and indoor unit)

This is the circuit for transmitting and receiving the signals between the remote controller and indoor unit in serial signal.

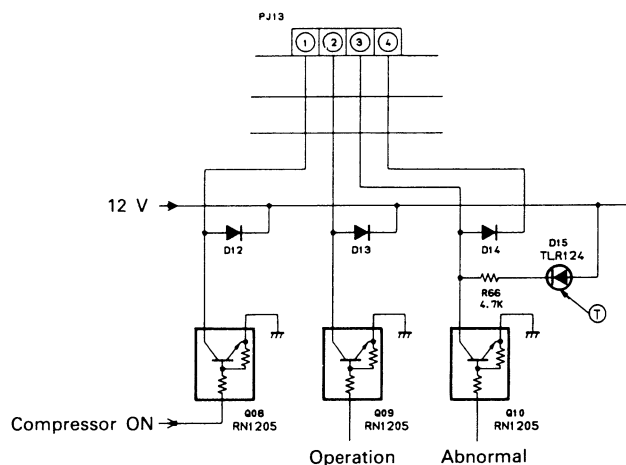
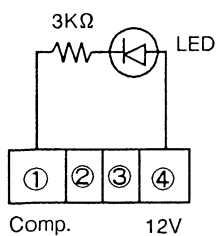
Point ① is a LED (green) which flashes when there are signals from the remote controller. At ② and ③, the signals as illustrated below are output.



## 9.11 Optional circuit

A circuit which allows for the take-out of the signals of abnormal, operation and Compressor-ON. Point ① is a LED which lights at abnormal.

The connector pin 1 outputs 12V. When you want to see the signal of compressor-ON, you can do it simply with the circuit below.

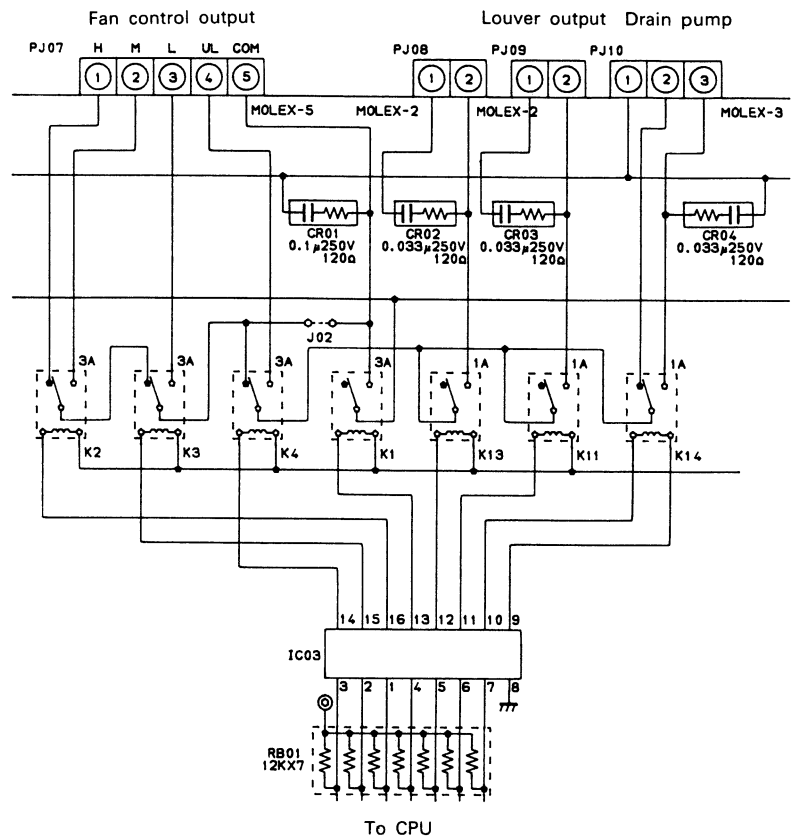


### 9.13 Relay circuit

The relay circuit consists of the diagram in the righthand side.

The relay performs the following functions:

- K1: Turning fan on and off
  - K2: Changing over H/M of fan
  - K3: L tap of fan
  - K4: UL tap of fan
  - K11: Turning louver on and off
  - K14: Turning drain pump on and off
- (① - ③)

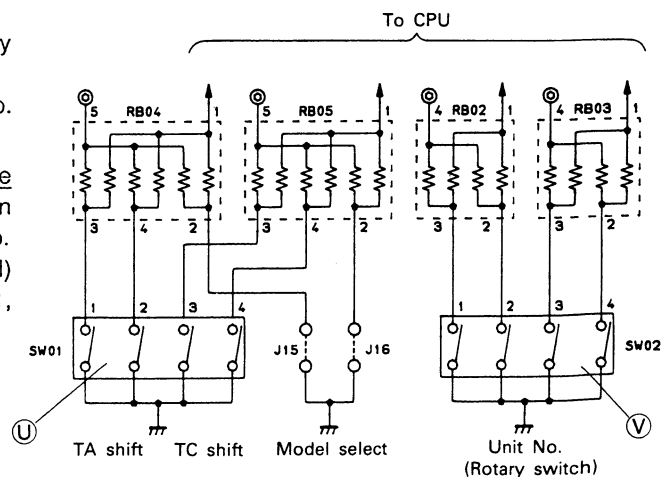


### 9.14 Switch circuit

TA shift, TC shift and unit No. are changed over by the switch.

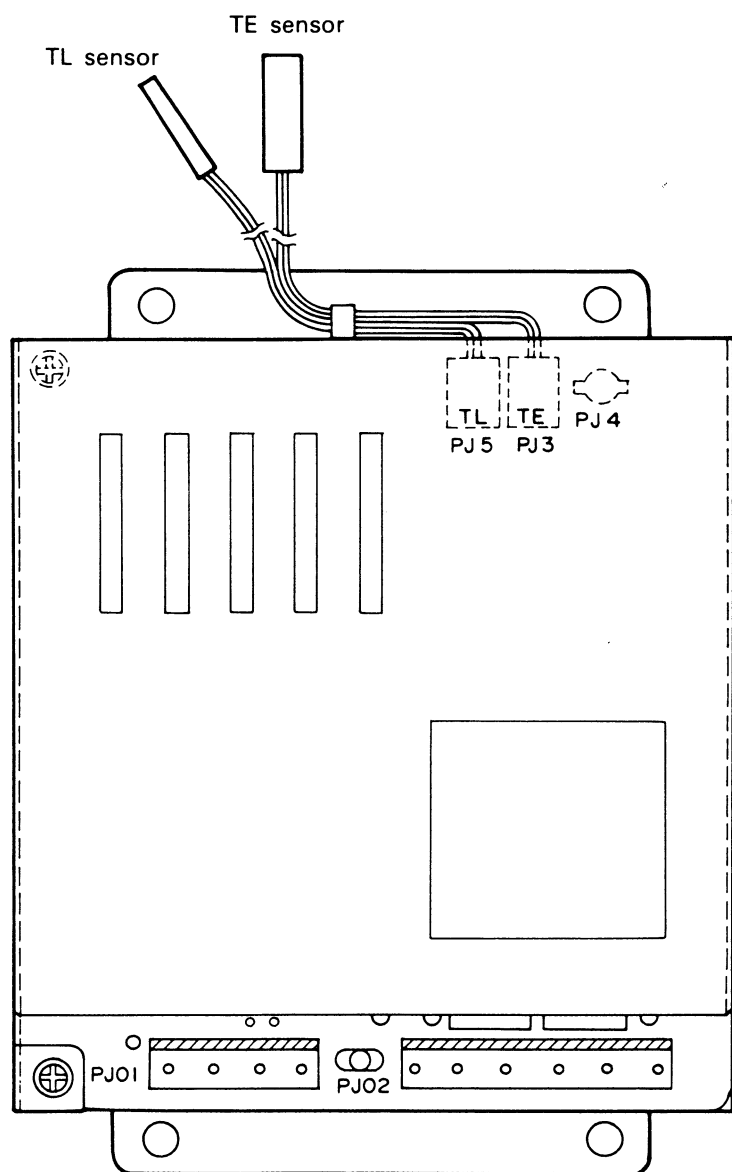
TA shift and TC shift are set in factory with unit No. at "1".

In servicing, the setting should be made to the same TA/TC shift as the PC board attached originally. In case of operating one single unit, unit No. "1" will do. With the operation of many units (multi units control) the unit No. should be adjusted in such a way as 1, 2, 3 .....

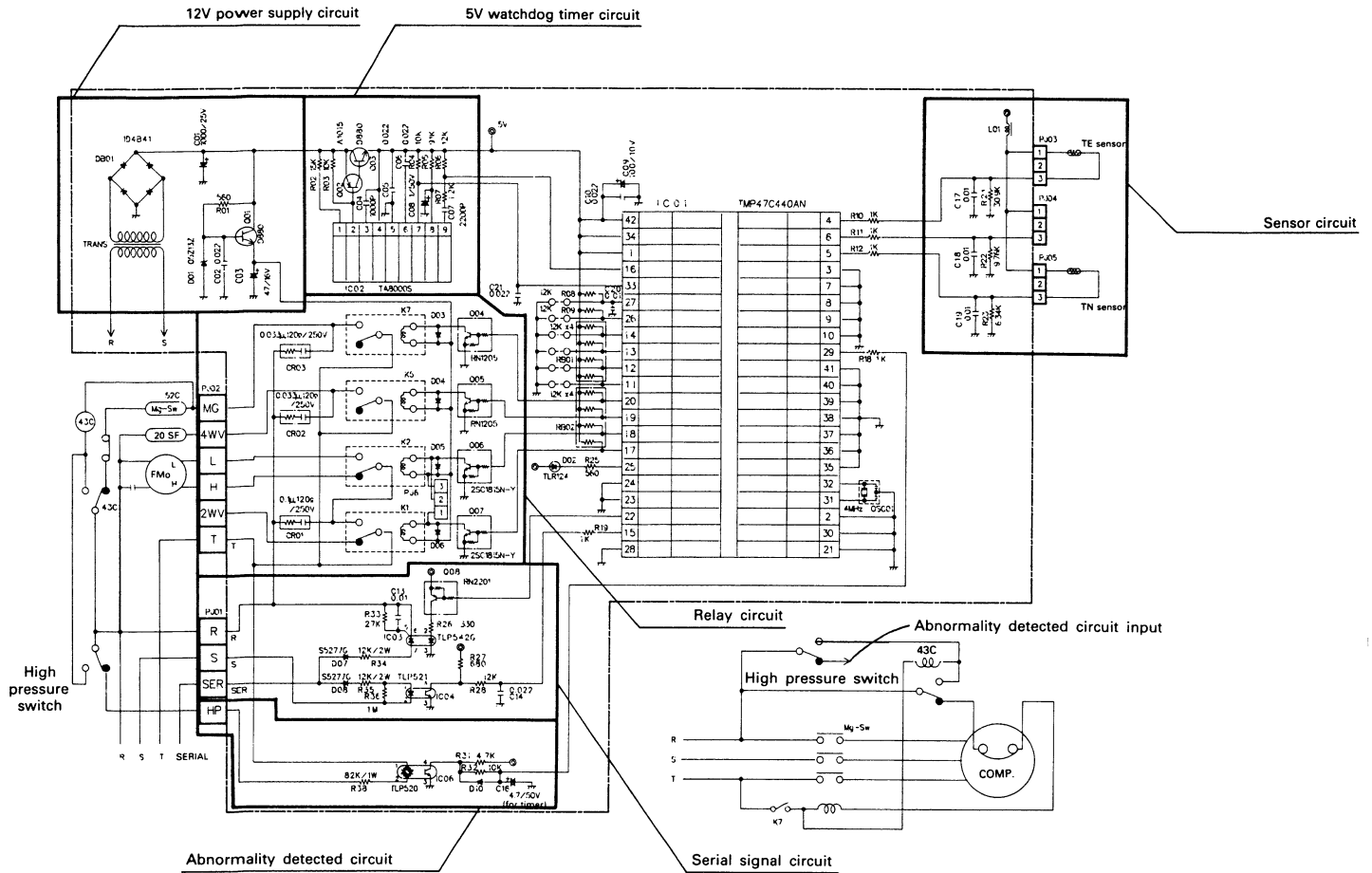


## 10. DESCRIPTION OF OUTDOOR UNIT CONTROL CIRCUIT

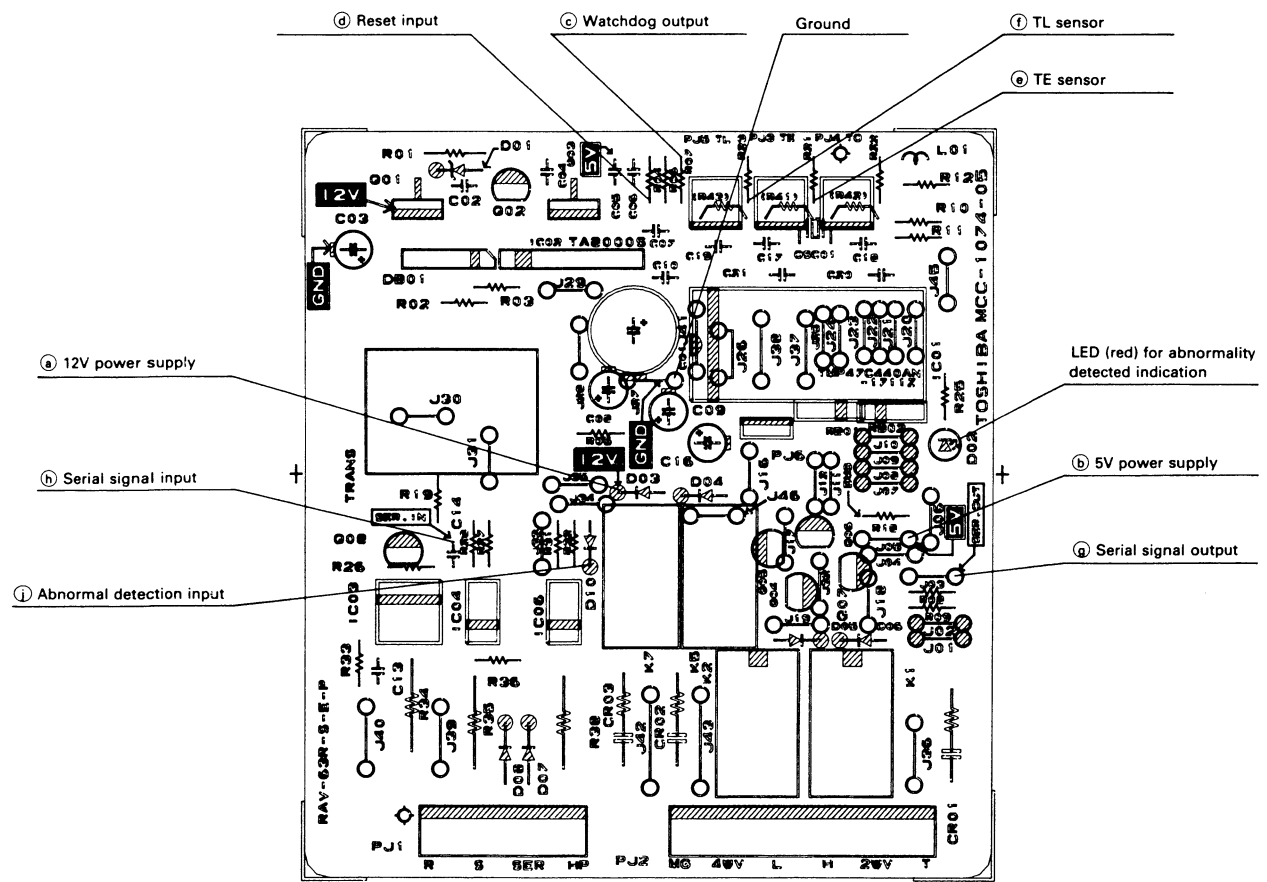
### 10.1 Outdoor unit control box



## 10.2 Outdoor unit control circuit diagram

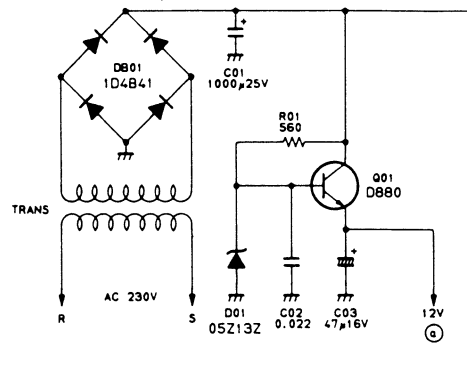


# 10.3 Outdoor unit PC board



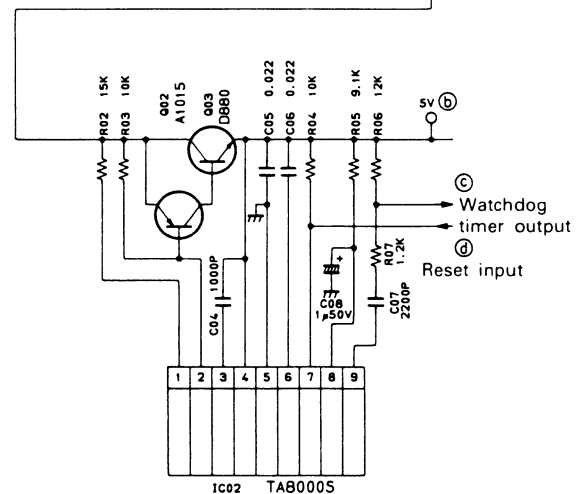
#### 10.4 12V power source circuit

Outdoor PC board has a built-in transformer and full-wave rectification by diode bridge (DB01) followed by the provision of transistor (Q01) produces DC power source (a) at 12V.



### 10.5 5V Watchdog timer circuit

Basically, the same description as the indoor PC board applies, provided, however, that the reset circuit is not added to the outdoor side.



## 10.6 Sensor circuit

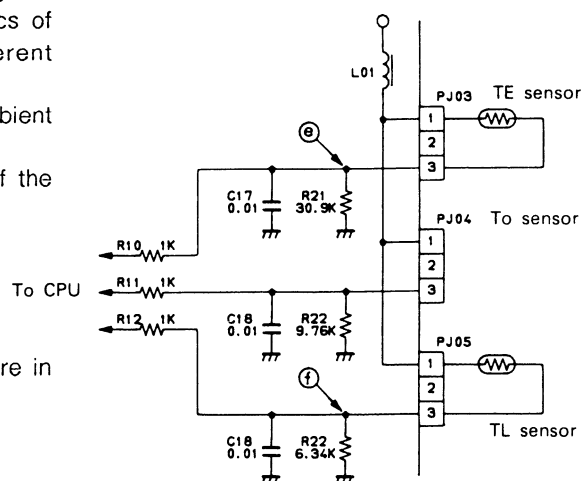
This circuit detects the temperature by dividing voltage with resistance and sensor and bringing the voltage value into CPU, using the characteristics of the sensor that resistance varies with different temperatures.

TE is for defrosting, while TL is for low ambient cooling operation.

The following voltages are produced at each of the temperatures.

	0°C	25°C
TE (e)	2.3V	3.8V
TL (f)	0.8V	2.0V

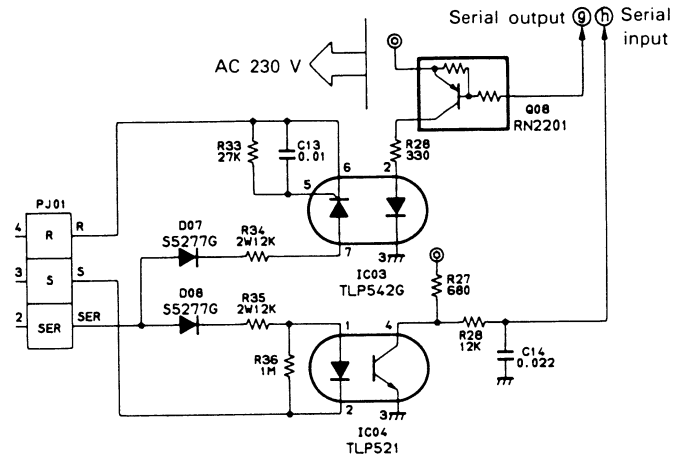
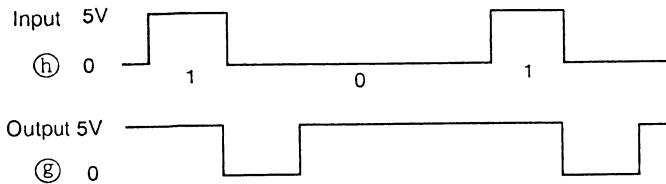
When ⑤/ ⑥ are at GND or 5V, the sensors are in open or short-circuited.





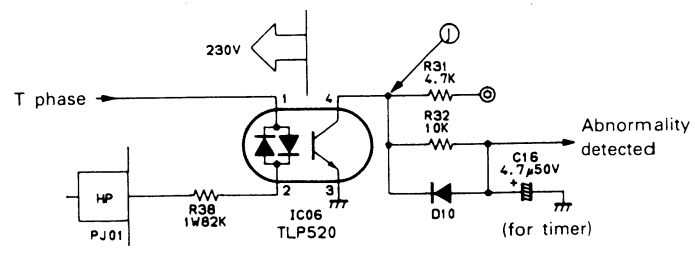
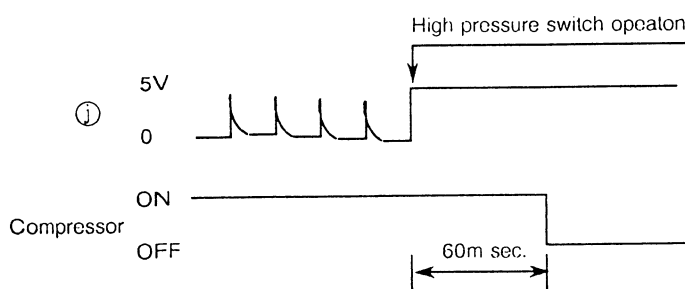
### 10.7 Serial signal circuit (between indoor and outdoor units)

Transmits and receives the signals between indoor and outdoor units in serial signals. As 230V is used for transmitting the signal, the microcomputer section is insulated with photo-coupler with 5V being supplied.



### 10.8 Abnormality-detecting circuit

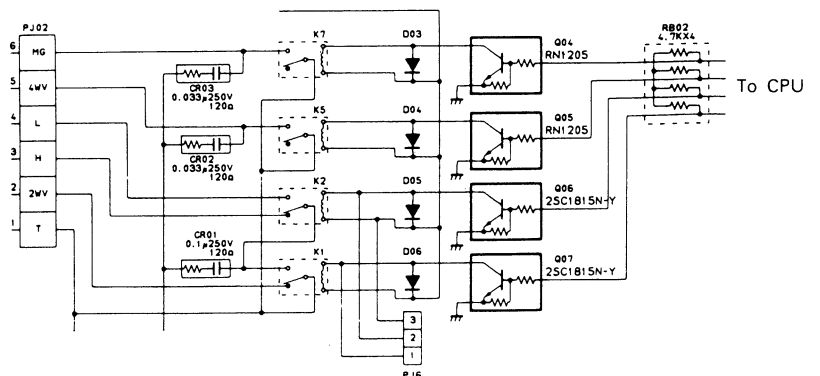
When high pressure switch is operated, abnormality is detected to stop the compressor.



### 10.9 Relay circuit

The relay circuit consists of the diagram in the righthand side.

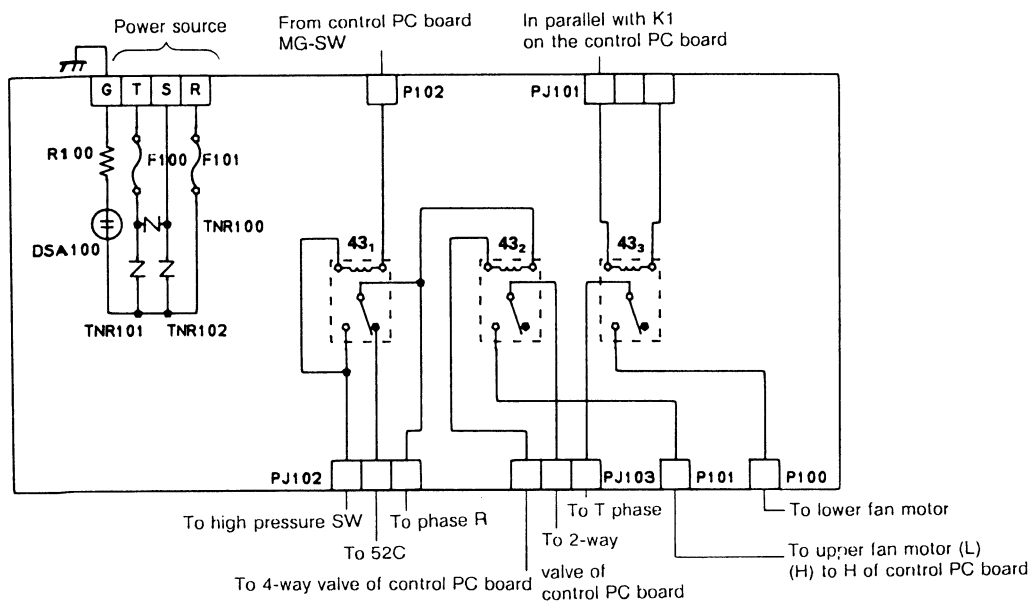
- K1: Turning fan on and off (2-way valve)
- K2: Changing over H/L of fan
- K5: Turning 4-way valve on and off
- K7: Turning compressor on and off



## 11. OPERATION OF RELAY PC BOARD (MCC-1075) (RAV-360AH8, 460AH8)

11.1 Purpose: Outdoor fan motor control and absorption of power source surging

11.2 Circuit



### 11.3 Operation

		K1 OUTPUT	MG SW OUTPUT	4-WAY VALVE OUTPUT	2-WAY VALVE OUTPUT	HIGH PRESSURE SW	FAN MOTOR		
		Relay 43 <sub>3</sub>	Relay 43 <sub>1</sub>	Relay 43 <sub>2</sub>	Relay 43 <sub>2</sub>	Relay 43 <sub>1</sub>	Upper (H)	Upper (L)	Lower
Cooling	Normal operation	○	○	×	×	×	○	×	○
	High pressure switch operation	×	×	×	○ K101 OFF	○	×	×	×
	Low ambient operation	○	○	×	×	×	×	×	×
Heating	Normal operation	○	○	○	×	×	○	×	○
	In the release	×	○	○	Through contact 43 <sub>2</sub>	×	×		×

## 12. EMERGENCY OPERATION (COOLING OPERATION ONLY)

By way of temporary expedient, change-over connectors are incorporated which allow for application of 240V directly to indoor fan motor, outdoor fan motor and magnet switch. In this case, operation and stop is effected by ON/OFF of the power line. (The emergency operation is not provided for heating as it can be substituted by other heating appliances and also because of nonavailability of defrosting approach).

### RAV-360AH8, 460AH8

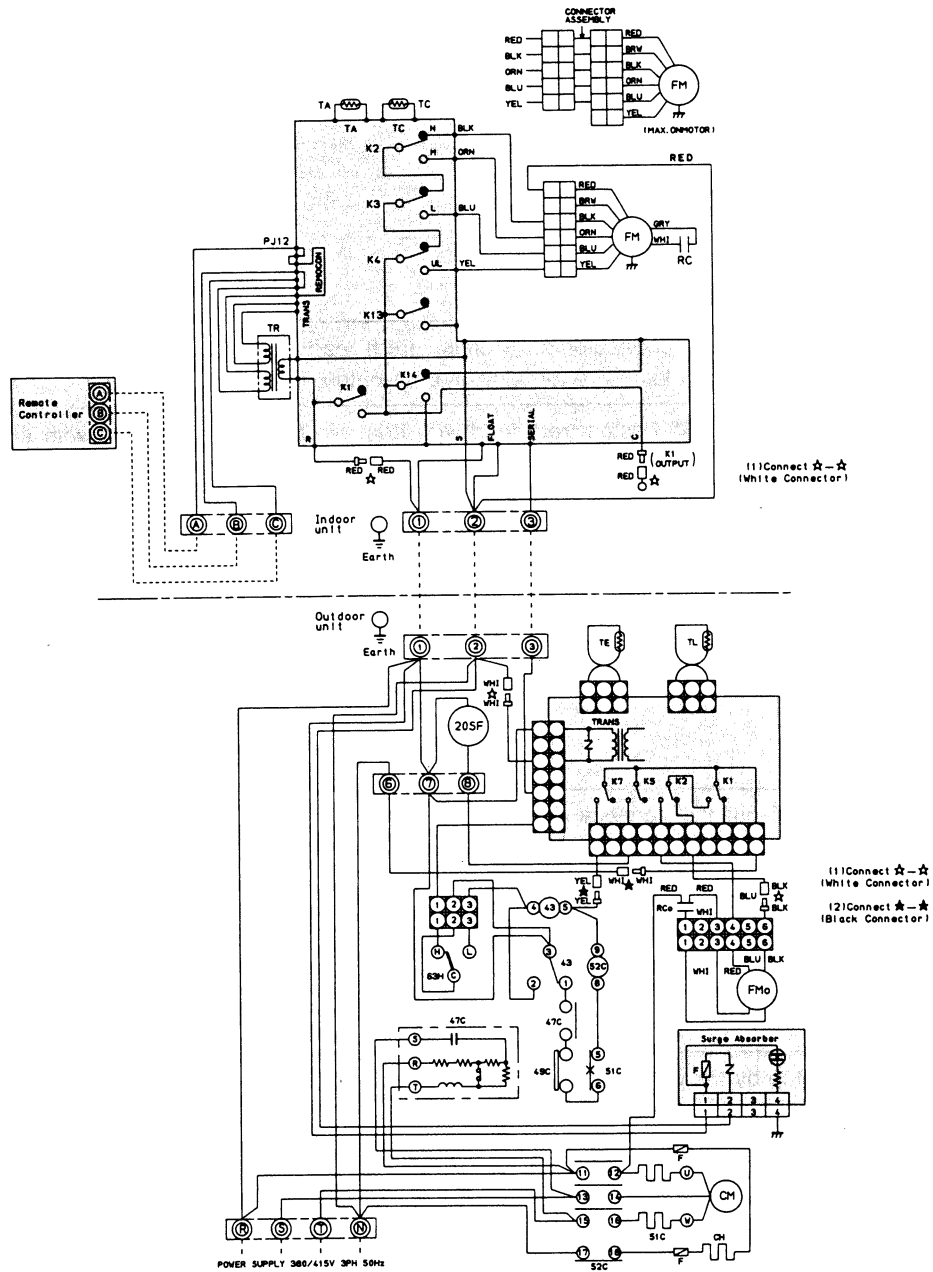
Counter-measures	Indoor connector	Pull out the connector of R phase (red) lead wire from pin (1) and connect it with the connector of lead wire for fan motor K1 output (red).
	Outdoor connector	Pull out #250 Faston (red) lead wire from pin (12) and connect it with the vacant pin (1). Pull out 1P white connector for lower fan motor and connect it with 1P white connector of pin (12). Take out 1P connectors of yellow lead wire and black lead wire for relay output connectors of control PC board and connect yellow lead from relay PC board P102 with black lead coming from (9).
Operation	Operation and stop by the power switch at hand. (High pressure switch becomes the only protective circuit.)	

### RAV-260AH8

Counter-measures	Indoor connector	Pull out the connector of R phase (red) lead wire from pin (1) and connect it with the connector of lead wire for fan motor K1 output (red).
	Outdoor connector	Pull out 1P white connector for fan motor and connect it with 1P white connector of pin (2). Take out 1P connectors of yellow lead wire and black lead wire for relay output connectors of control PC board and connect yellow lead from relay 43 [or 43 <sub>2</sub> ] with black lead coming (2) [or (6)].
Operation	Operation and stop by the power switch at hand. (High pressure switch becomes the only protective circuit.)	

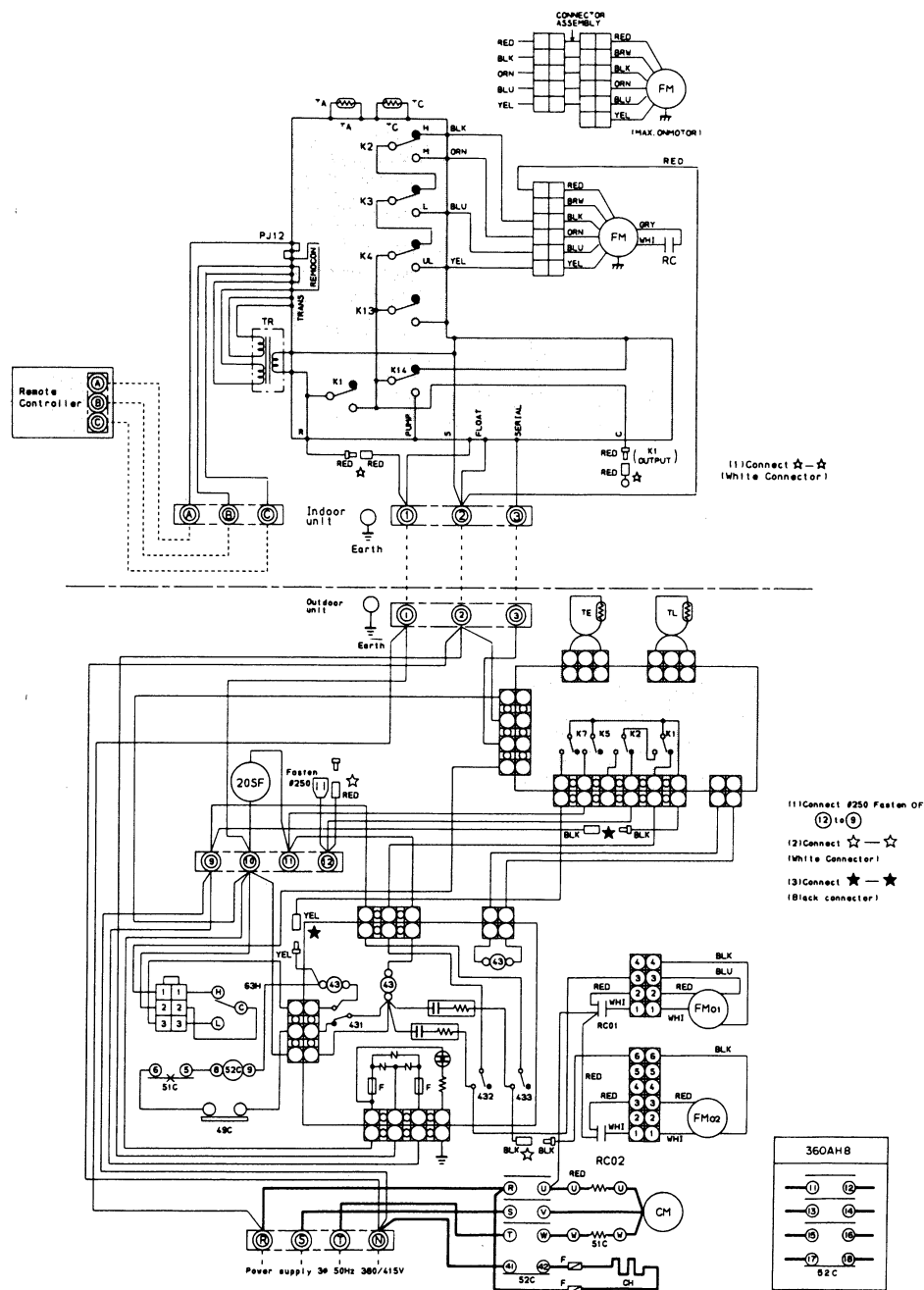
For the method, refer to next page.

RAV-260BH/260AH8



Symbol	Name	Symbol	Name	Symbol	Name
20SF	Solenoid Coil (4way valve)	TA	Sensor	TE	Sensor
K <sub>1</sub> ~ K <sub>14</sub>	Relay	CM	Compressor	F	Fuse
49C	Thermostat	52C	Magnetic Contactor	RCo	Running Capacitor
51C	Overload Relay	43	Relay	TC	Sensor
47C	Return Lock	63H	High Pressure Switch		
FM	Fan Motor	CH	Crank Case Heater		
RC	Running Capacitor	FMo	Fan Motor		
TR	Transformer	TL	Sensor		

# RAV-360BH/360AH8, RAV-460BH/460AH8

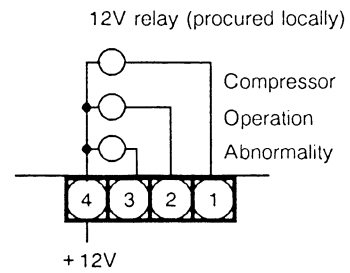


Symbol	Name	Symbol	Name	Symbol	Name
20SF	Solenoid Coil	52C	Magnetic Contactor	K <sub>1~14</sub>	Relay
K <sub>1~K<sub>7</sub></sub>	Relay	FM <sub>C1, C2</sub>	Fan Motor (Outdoor)	TC	Sensor
49C	Inner Overload Relay	TL	Sensor	TA	Sensor
51C	Overload Relay	TE	Sensor		
43 <sub>1~3</sub>	Relay (Outdoor)	F	Fuse		
63H	High Pressure Switch	FM	Fan Motor		
CH	Crank Case Heater	RC	Running Capacitor		
CM	Compressor	TR	Transformer		

### 13. APPLIED CIRCUIT

(1) Display output  
(PJ13)

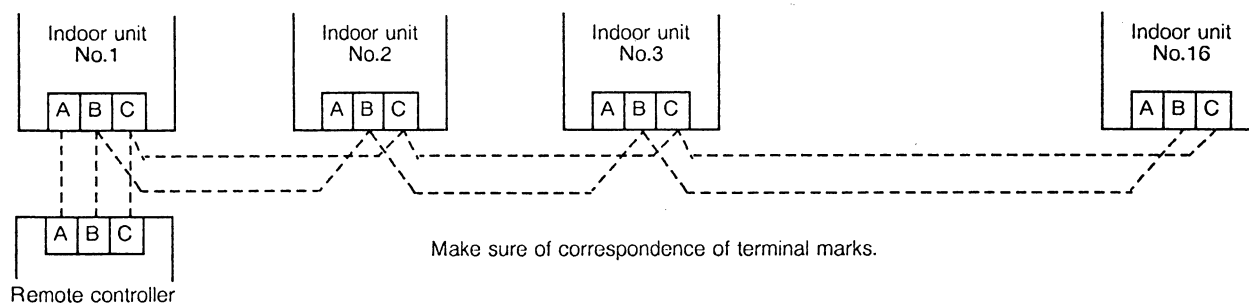
12V output is provided on the indoor PC board for operation display (interlocked with LED), compressor operation display and outdoor abnormality display.



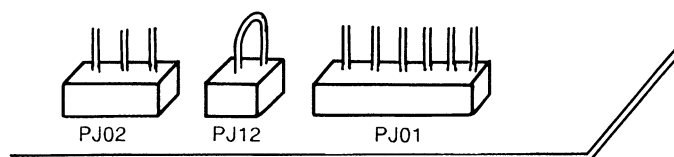
## 14. WIRING FOR GROUP OPERATION

Up to 16 units can be controlled as a group by one remote controller.

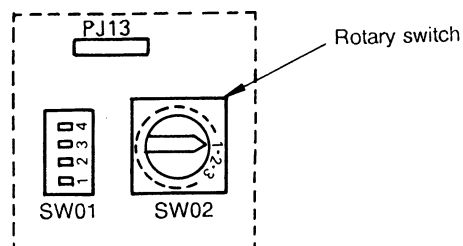
- ① Align the phase sequence of the power supply to all outdoor units.
- ② Connect the terminals A, B, C on both of the remote controller and the indoor unit of No.1 unit.
- ③ Connect terminals B, C on both indoor units of No.1 and No.2 unit. Then connect in the same way No.2 and No.3, No.3 and No.4 .... up to No.16 unit.



- ④ Remove the PJ12-connector on the indoor PC board of No.2 unit and up to No.16 unit to prevent malfunction.

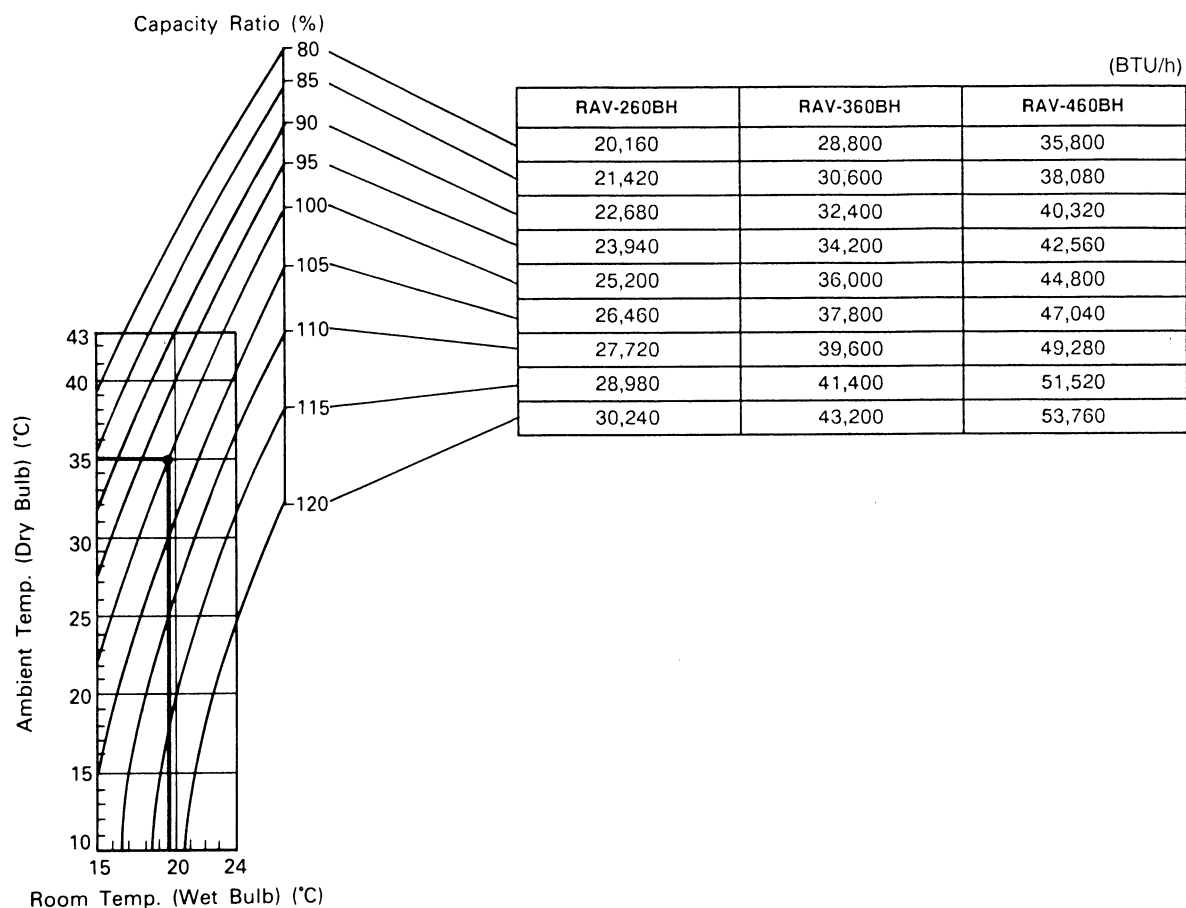


- ⑤ Set each unit No. rotary switch on the indoor PC board. The unit connected to the remote controller should be set as No.1 unit. then set No.2 and up to No.16 so that start time of each unit is respectively delayed to prevent simultaneous starting current.

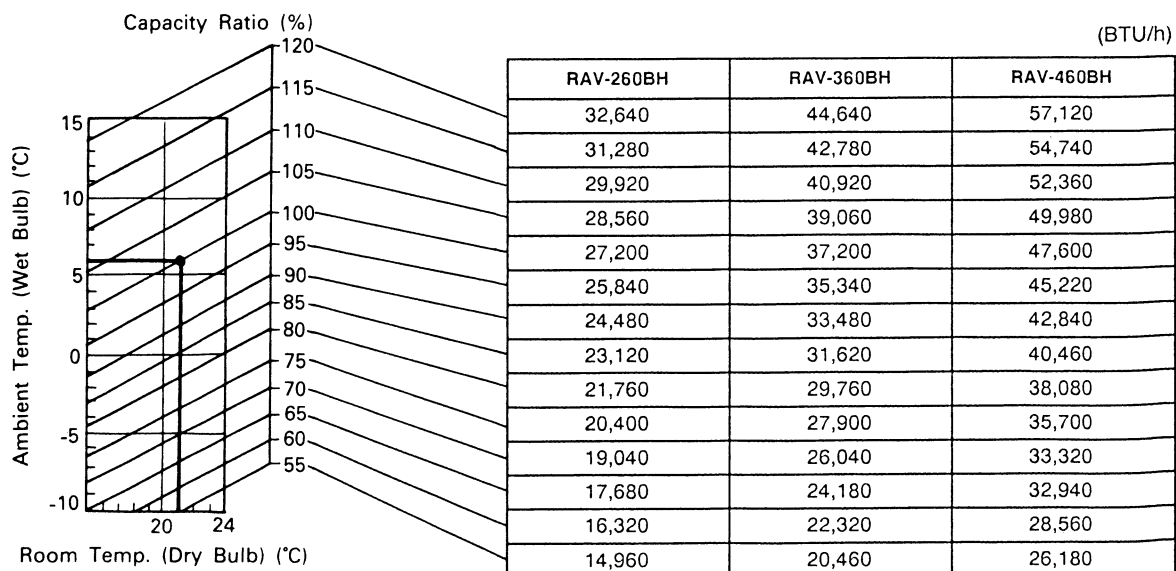


## 15. PERFORMANCE CHARACTER

### 15.1 Cooling capacity



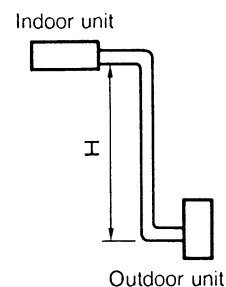
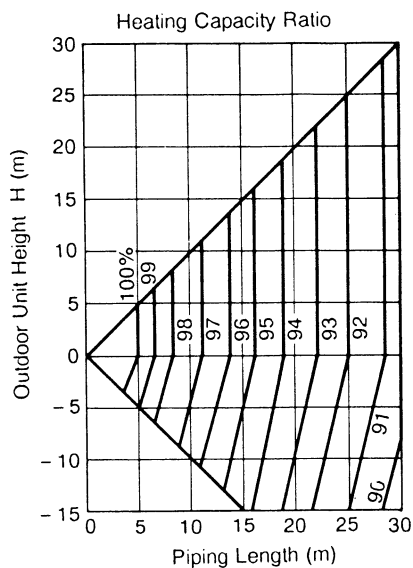
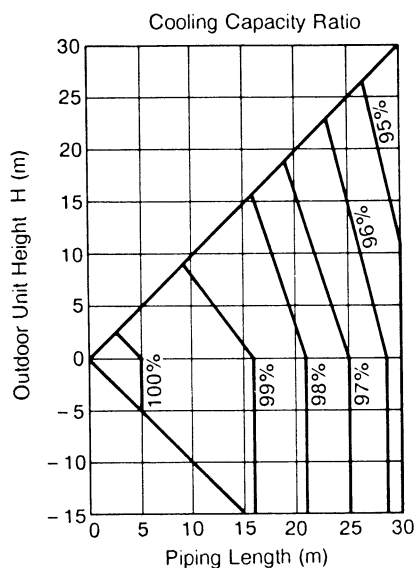
### 15.2 Heating capacity



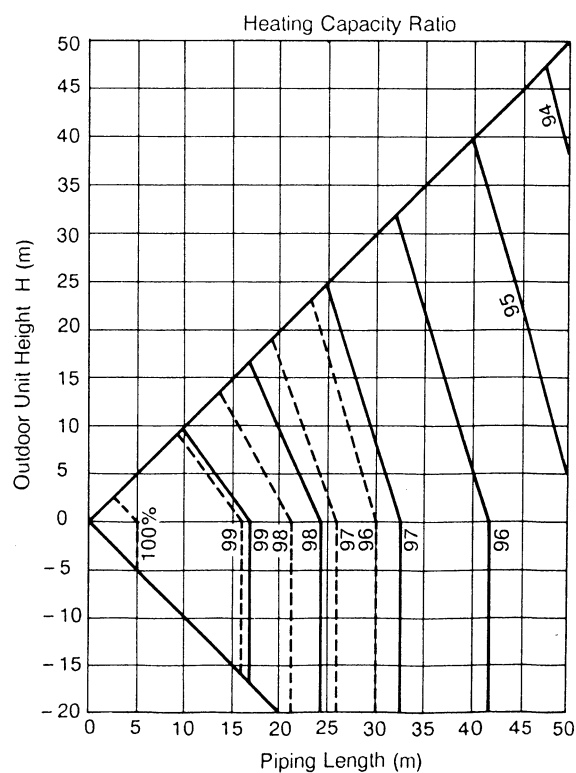
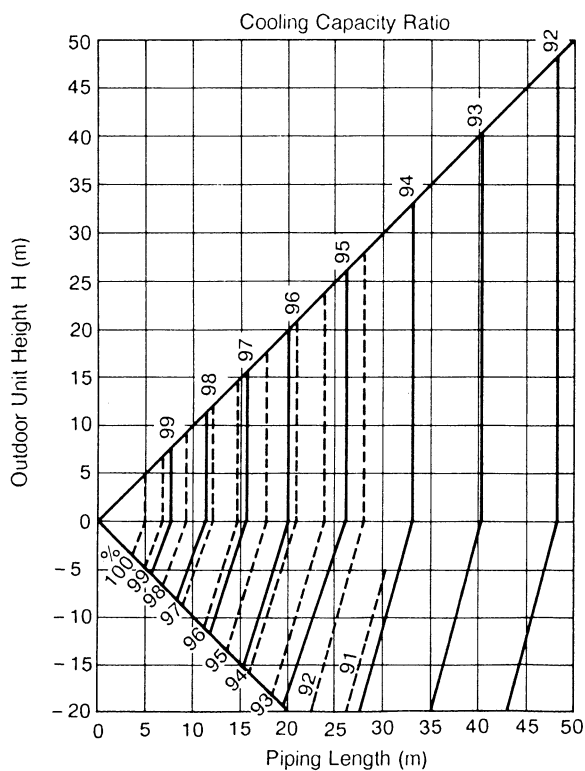


### 15.3 Piping length/cooling capacity/heating capacity

#### RAV-260BH/260AH8

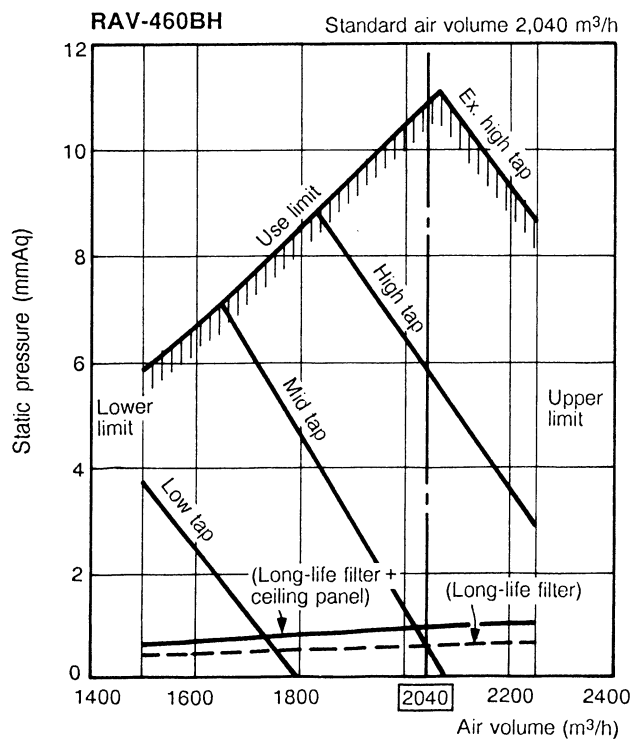
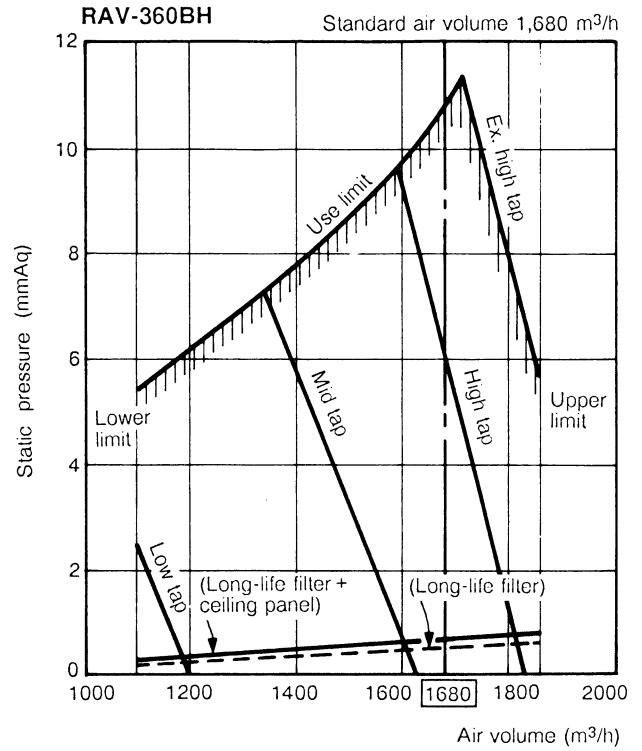
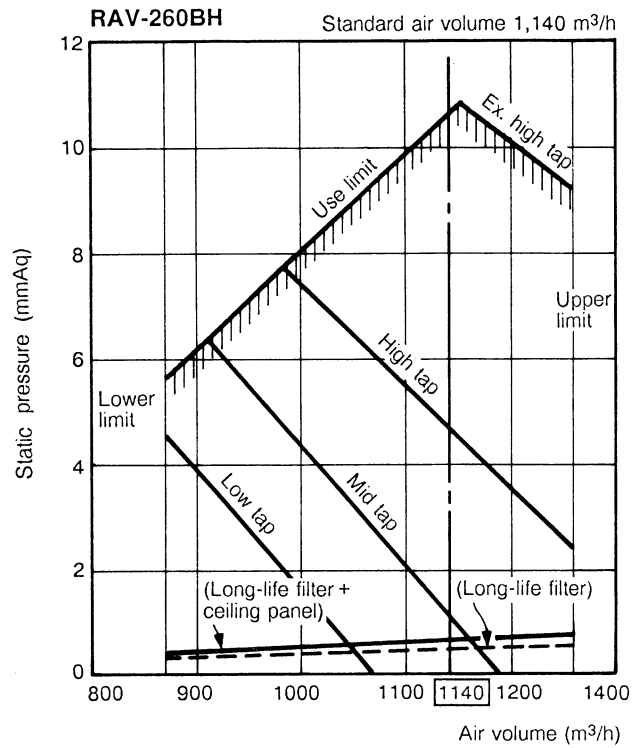


#### RAV-360BH/360AH8, 460BH/460AH8



The broken line shows in case the piping length is 30m or less.

## 15.4 Blower performance



### Fan motor tap-changing

- To increase the static pressure of the fan tap-changing is required.
- Connect the connector assembly (attachment) between the fan motor and its wiring in the electrical parts box.

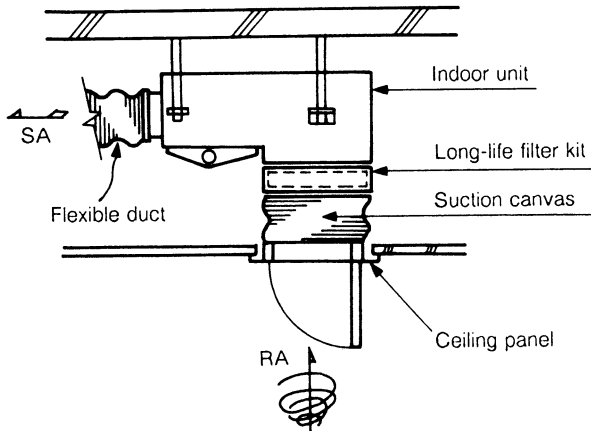
### 15.5 Piping length/additional refrigerant volume

Model (RAV-)	Piping length less than (m)	20	Additional amount of refrigerant at installation site (kg)						Recharge amount of interchange time (kg)									
			25	30	35	40	45	50	5	10	15	20	25	30	35	40	45	50
260BH	Filled at factory		0.3	0.6					2.3	2.4	2.45	2.55	2.85	3.15				
360BH			0.25	0.5	0.75	1.0	1.25	1.5	3.0	3.15	3.25	3.4	3.65	3.9	4.15	4.4	4.65	4.9
460BH			0.25	0.5	0.75	1.0	1.25	1.5	3.6	3.7	3.8	3.9	4.15	4.4	4.65	4.9	5.15	5.4

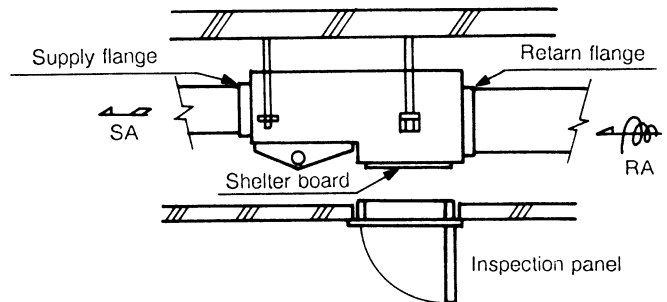
- The amount of refrigerant put into the outdoor unit at the factory is equivalent to the one that fills up 20m length of refrigerant pipe.
- If the length of refrigerant pipe is 20m or less, addition of refrigerant at the installation site is unnecessary. If the length of the pipe exceeds 20m, add the refrigerant R-22.
- Overcharge or undercharge of refrigerant in the outdoor unit will cause malfunction of the compressor. The prescribed amount of the replenishment of the refrigerant is shown in the table above.  
The permissible amount of refrigerant is the prescribed amount  $\pm 50g$ .

## 16. SAMPLES OF INSTALLATION COMBINED WITH OPTIONAL PARTS

(1) Bottom suction method



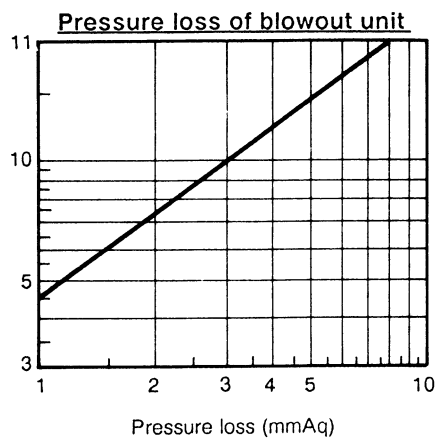
(2) Suction duct connection method



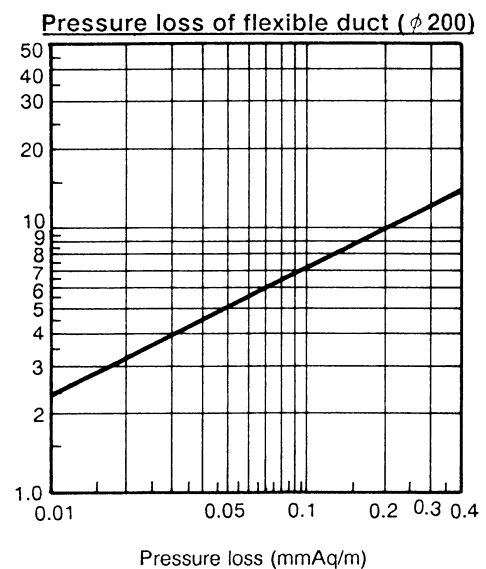
Installation method	Model		RAV-260BH	RAV-360BH, 460BH
	Combined optional parts			
Bottom suction method	Ceiling panel		RBC-B260PE(W)	RBC-B460PE(W)
	Suction canvas		RBC-CA260BE	RBC-CA460BE
	Long-life filter kit		RBC-LK260BE	RBC-LK460BE
	*Flexible duct		RBC-FD202E (length: 2m)	
	Blowout unit		RBC-BU1E (W)	
Suction duct method	Shelter board		Refer to site production page 54.	
	Supply flange		Refer to site production page 53.	
	Return flange		Refer to site production page 53.	

\* Maximum length of the flexible duct is up to 10 m.

Pressure loss of optional parts  
Model: RBC-BU1E (W)



Model: RBC-FD202E



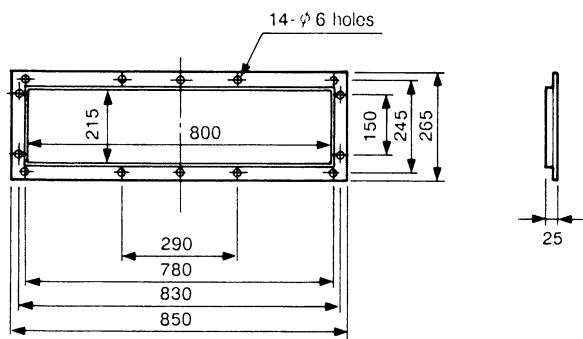
## 17. CONNECTION FLANGE (REFERENCE)

- **Connection Flange of Air Outlet and Inlet Ducting**

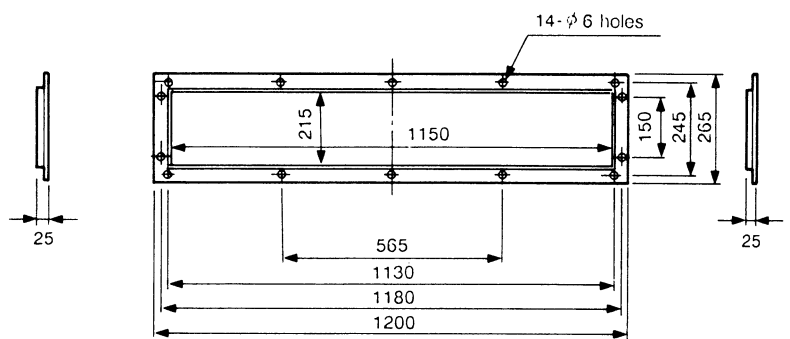
Connection flange is not provided on the indoor unit. Procure it as shown below at site.

### SUPPLY FLANGE

#### RAV-260BH

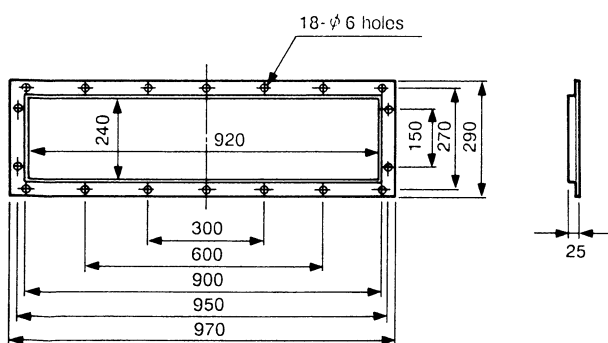


#### RAV-360BH, 460BH

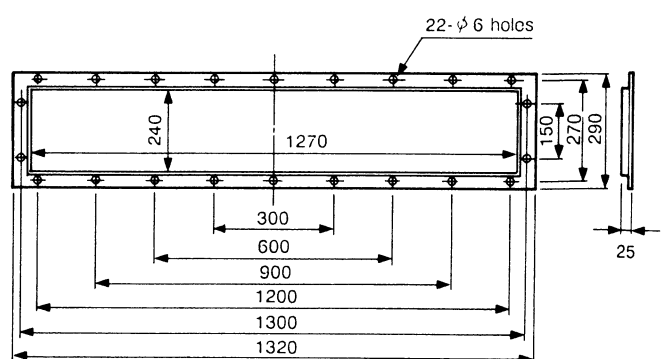


### RETURN FLANGE

#### RAV-260BH



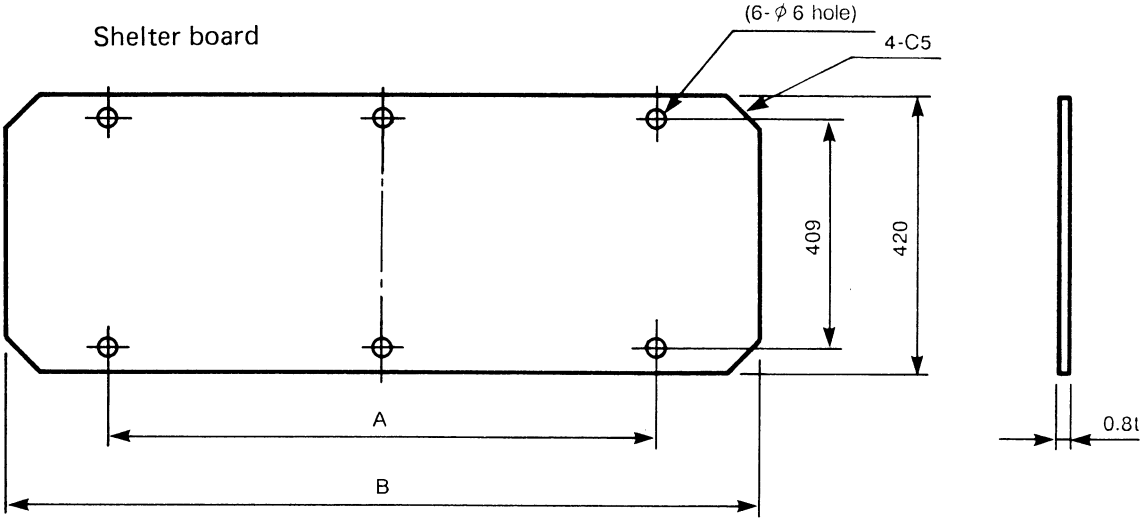
#### RAV-360BH, 460BH



# 18. SHELTER BOARD

- Shelter Board of Air Inlet**

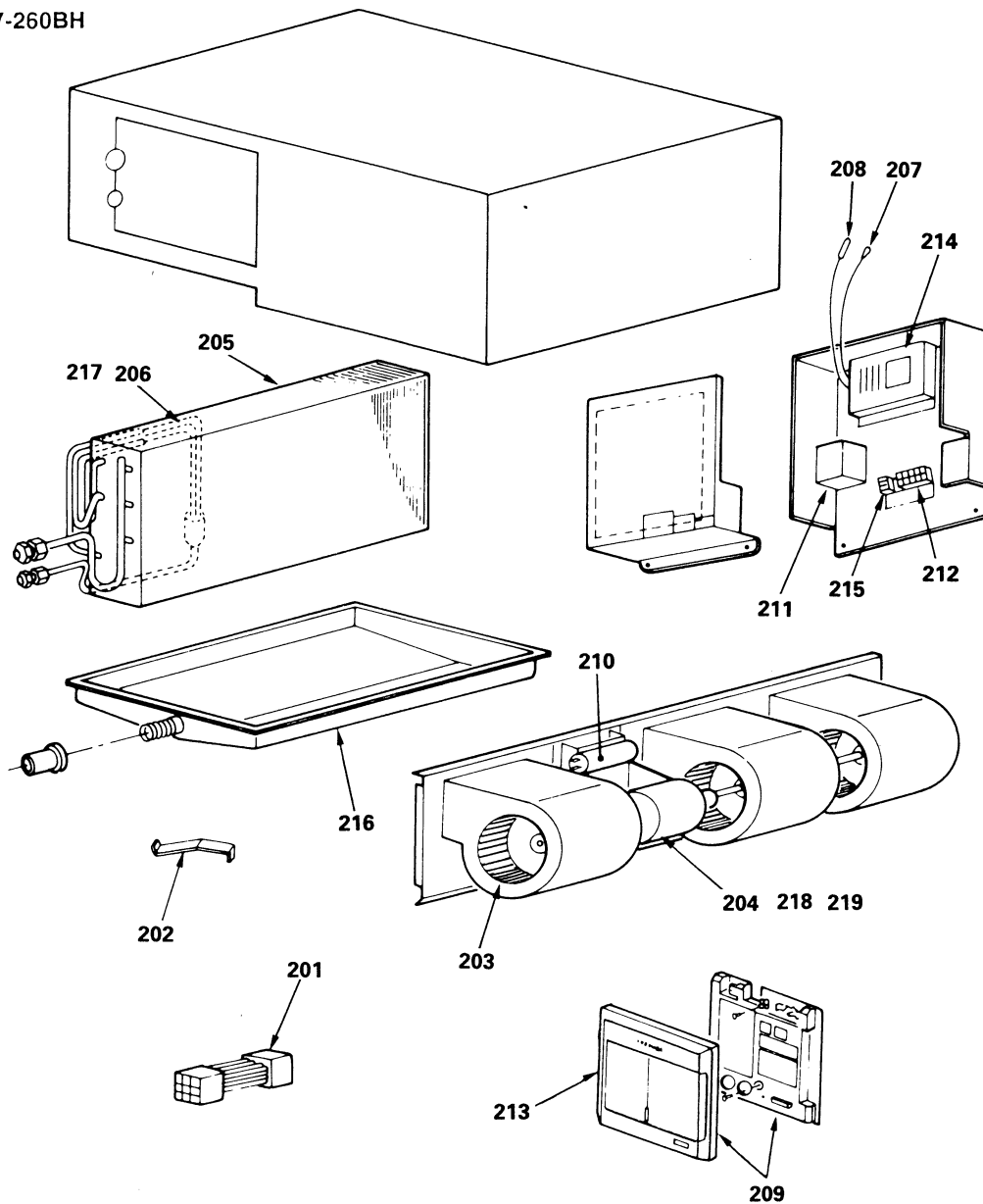
Shelter board is not provided on the indoor unit.  
Procure it as shown below at site.



Model	A	B
RAV-260BH	700	1000
RAV-360BH, 460BH	1050	1350

## 19. EXPLODED VIEWS AND PARTS LISTS

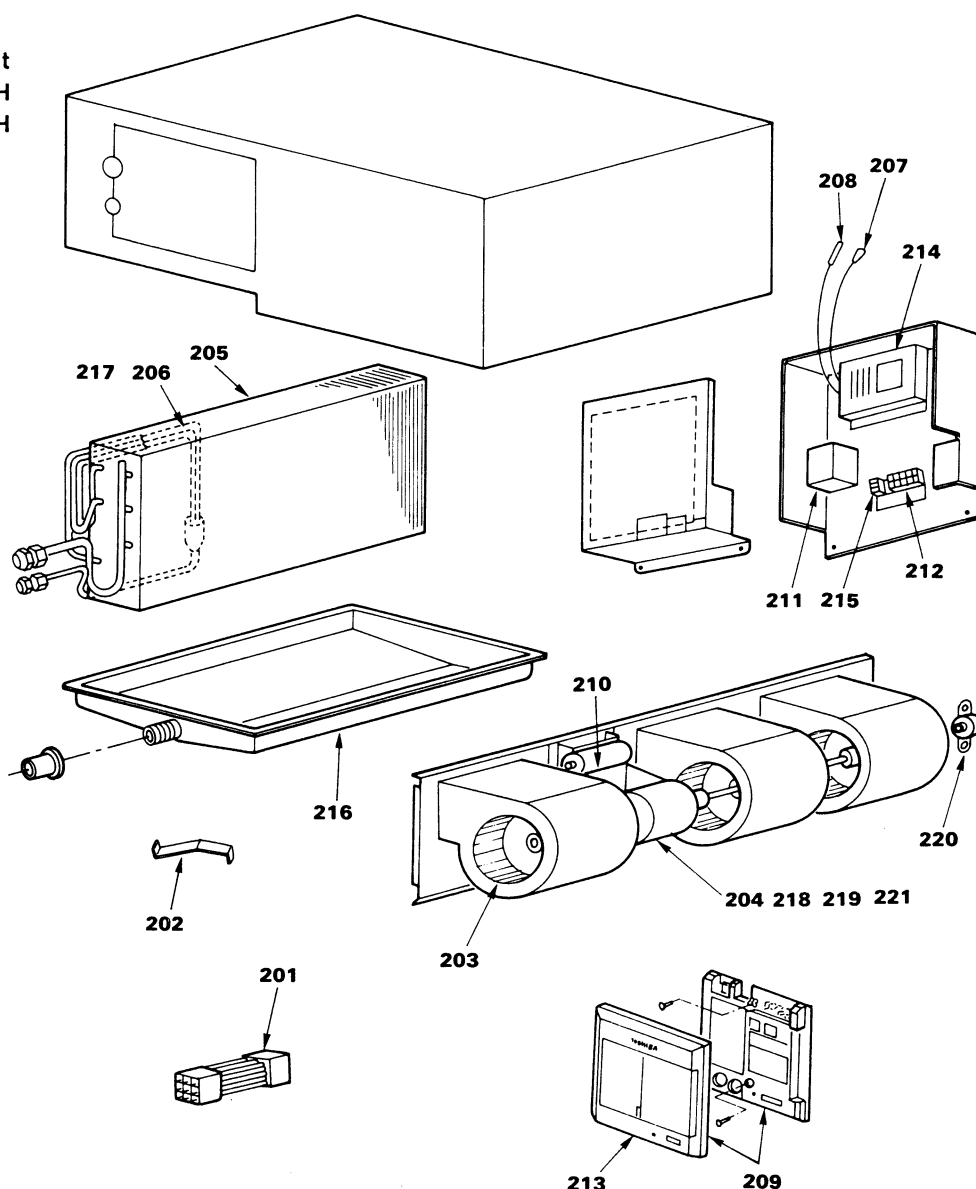
19-1 Indoor Unit  
RAV-260BH



Location No.	Part No.	Description
201	43160394	Conector-9P
202	43019604	Holder,Sensor
203	43120149	Fan, Multi-Blade
204	43121516	Motor, Fan STF-200-100-4B
205	43144620	Evaporator
206	43147443	Distributor
207	43150103	Sensor
208	43150119	Sensor
209	43169461	Remote Controller
210	43155096	Capacitor, Electrolytic EAG40M505UF

Location No.	Part No.	Description
211	43158094	Transformer, Power
212	43060324	Terminal Block, 3P
213	43162029	Cover
214	43169544	PC, Board
215	43160372	Terminal Block, 3P
216	43191305	Drain Pan
217	43047527	Capillary Tube 2.0DIA
218	43039136	Band, Motor, Left
219	43039137	Band, Motor, Right

Indoor Unit  
RAV-360BH  
RAV-460BH

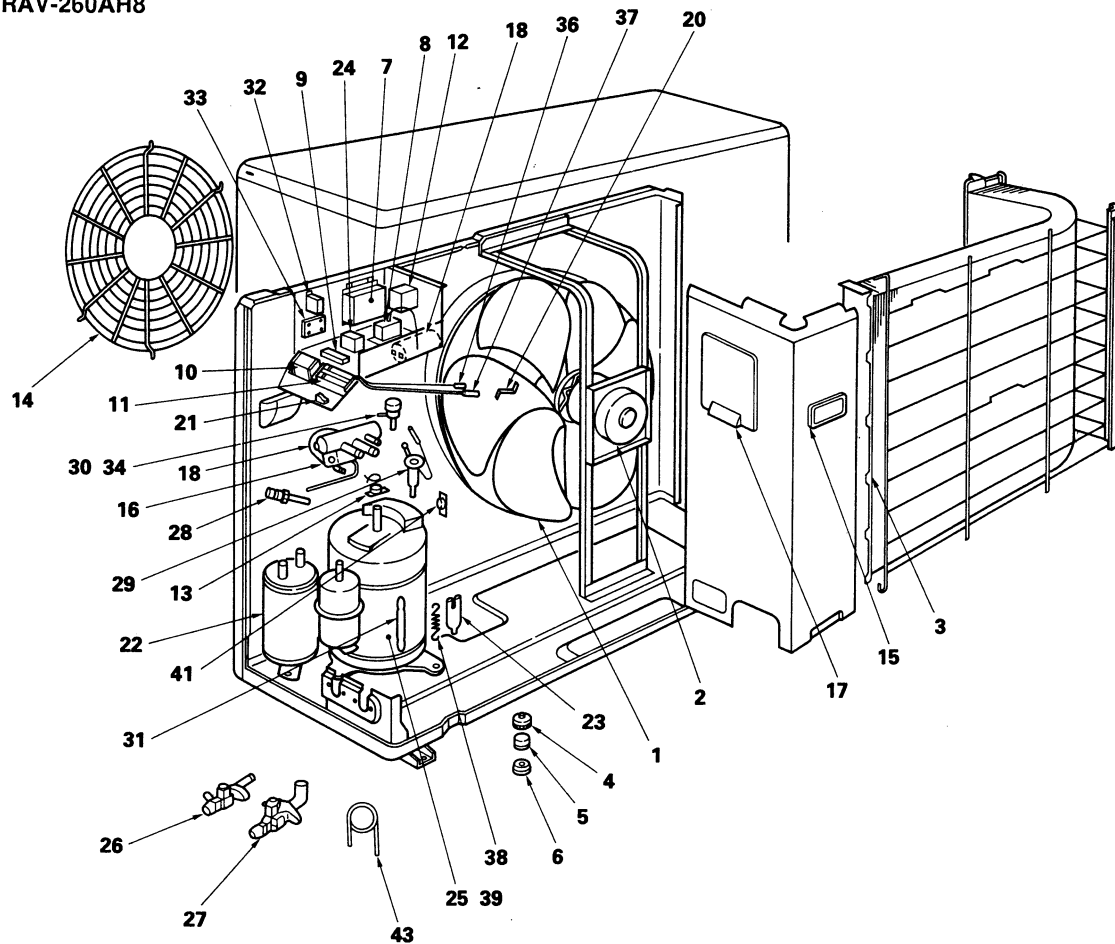


Location No.	Part No.	Description
201	43160394	Conector-9P
202	43019604	Holder, Sensor
203	43120149	Fan, Multi-Blade
204	43121528	Motor, Fan
204	43121535	Motor, Fan
205	43144625	Evaporator
205	43144626	Evaporator
206	43147532	Distoributor
206	43147533	Distoributor
207	43150103	Sensor
208	43150111	Sensor
209	43169461	Remote Controller
210	43155096	Capacitor, Electrolytic EAG40M505UF

Location No.	Part No.	Description
210	43155097	Capacitor, Electrolytic
211	43158094	Transformer, Power
212	43060324	Terminal, Block, 3P
213	43162029	Cover
214	43169544	PC, Board
215	43160372	Terminal Block, 3P
216	43191310	Drain Pan
217	43047527	Capillary Tube 2.0DIA
217	43146432	Tube Capillary
218	43039136	Band, Motor, Left
219	43039137	Band, Motor, Right
220	43125135	Bearing
221	43125137	Coupling



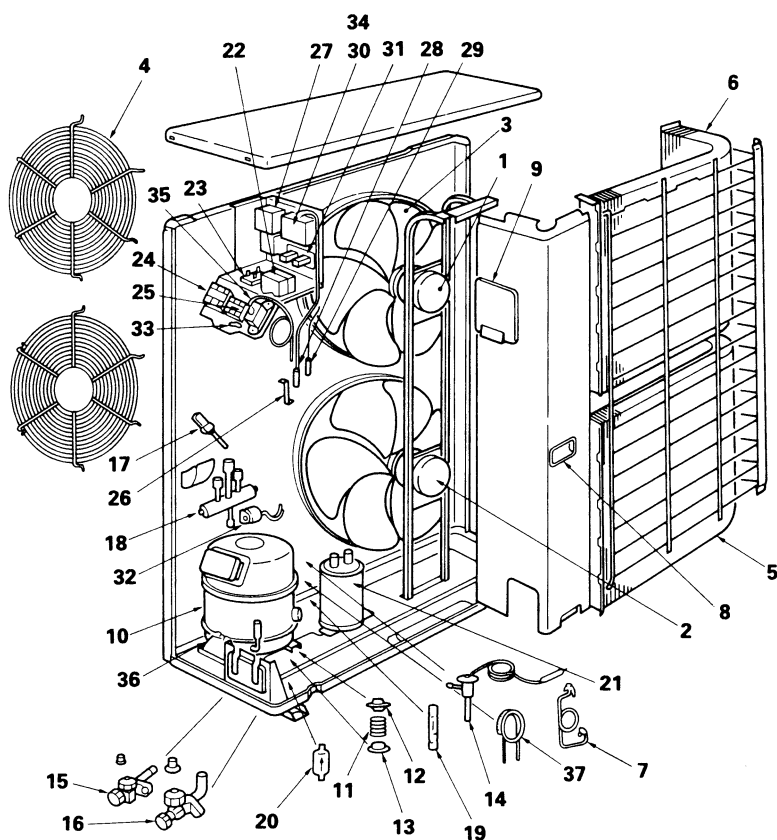
19-2 Outdoor Unit  
RAV-260AH8



Location No.	Part No.	Description
1	43120156	Fan, Propeller
2	43121489	Motor
3	43143546	Condenser
4	43049132	Base, Spring, B
5	43149198	Spring, Buffer
6	43149212	Base, Spring, A
7	43169469	PC Board
8	43146387	Switch-High-Pressure
9	43060157	Terminal Block, 4P
10	43160264	Terminal Block
11	43060324	Terminal Block, 3P
12	43152335	Magnetic Contactor
13	43050277	Thermostat, Bimetal
14	43191252	Guard-Fan
15	43119368	Hanger
16	43046220	Solenoid Coil
17	43162027	Cover, Electric Parts
18	43146368	4-Way Valve
20	43019604	Holder, Sensor
21	43063114	Holder

Location No.	Part No.	Description
22	43148114	Accumulator
23	43145082	Dryer
24	43155080	Capacitor, Plastic Film
25	43141302	Compressor, AC, 380/415V, 50Hz YH33, OX3-MS
26	43146451	Packed Valve (3/8")
27	43146417	Packed Valve, 5/8IN
28	43147321	Check Joint
29	43146433	Expansion Valve
30	43046156	Checked Valve
31	43146283	Checked Valve
32	43154117	Relay
33	43169438	Surge Absorber
34	43154148	Return Lock STR-4AB
36	43150130	Sensor, Cond. Out
37	43150129	Sensor, Heat Exch.
38	43193043	Spring
39	43157167	Heater, Crankcase
41	43063195	Holder Thermostat, Bimetal
43	43146459	Capillary Tube

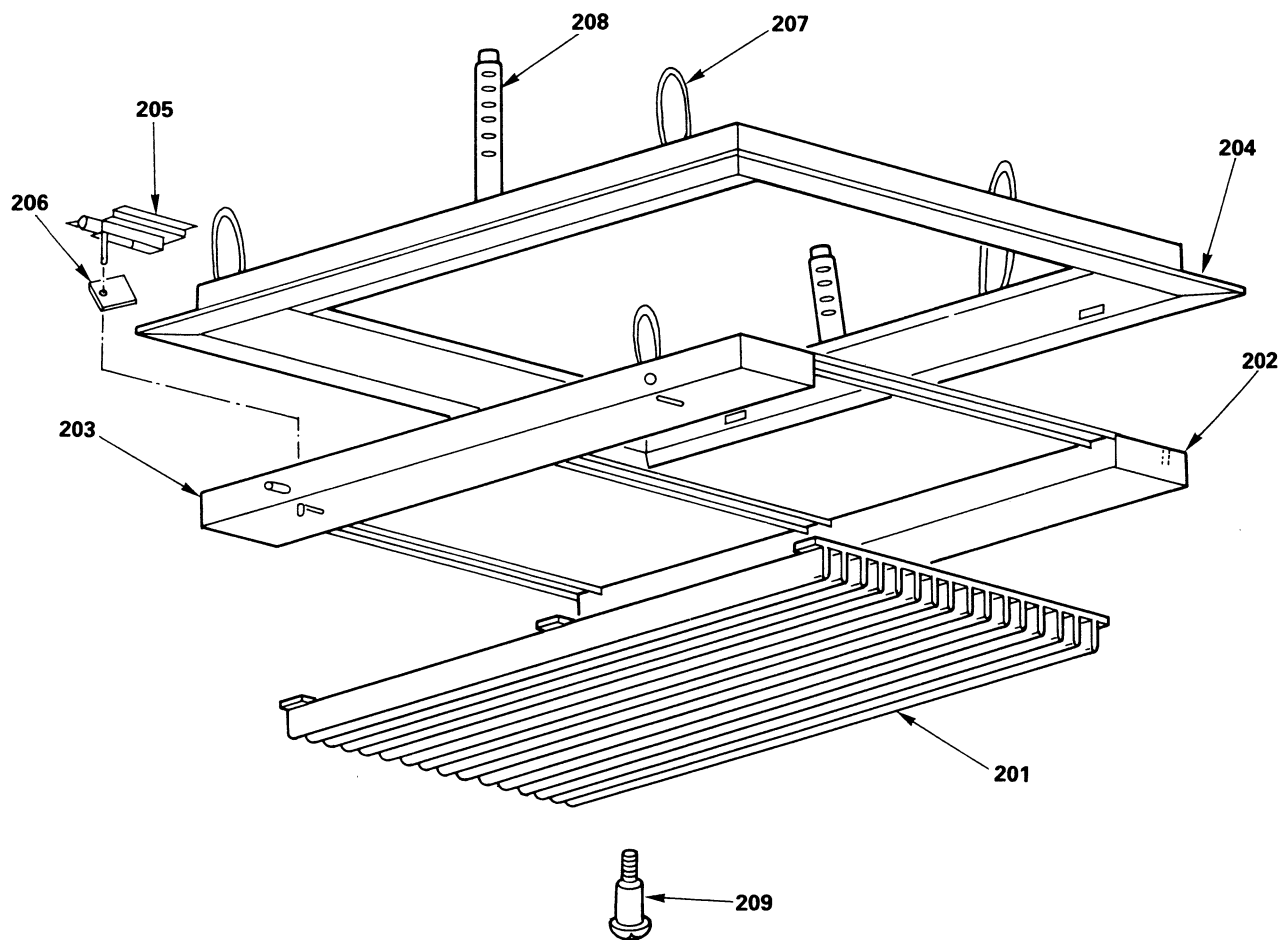
Outdoor Unit  
RAV-360AH8  
RAV-460AH8



Location No.	Part No.	Description
1	43121463	Motor, AC, 230V, 50Hz, Fan
2	43121464	Motor, AC, 230V, 50Hz, Fan
3	43120129	Fan, Propeller
4	43191252	Guard-Fan
5	43143478	Condenser, Lower (RAV-360AH8)
5	43143389	Condenser, Lower (RAV-460AH8)
6	43143514	Condenser, Upper (RAV-360AH8)
6	43143513	Condenser, Upper (RAV-460AH8)
7	43047492	Capillary-Tube (RAV-360AH8)
7	43047527	Capillary-Tube (RAV-460AH8)
8	43119368	Hanger
9	43162027	Cover, Electric Parts
10	43140404	Compressor, YH406JA
10	43140506	Compressor, YH506JA
11	43149198	Spring, Buffer
12	43149212	Base, Spring, A
13	43049132	Base, Spring, B
14	43146362	Expansion Valve (RAV-360AH8)
14	43146438	Expansion Valve (RAV-460AH8)
15	43146451	Packed Valve (3/8")
16	43146416	Packed Valve 3/4IN
17	43147321	Check Joint
18	43146251	4 Way Valve (RAV-360AH8)
18	43046008	4 Way Valve (RAV-460AH8)

Location No.	Part No.	Description
19	43146283	Checked Valve
20	43145092	Dryer
21	43148096	Accumulator
22	43155080	Capacitor, Plastic Film
23	43060479	Terminal Block, 4P
24	43160264	Terminal Block
25	43060324	Terminal Block, 3P
26	43019604	Holder, Sensor
27	43152329	Magnetic Contactor (RAV-360AH8)
27	43152312	Magnetic Contactor (RAV-460AH8)
28	43150129	Sensor, Heat Exch.
29	43150130	Sensor, Cond. Out
30	43169469	PC Board
31	43169467	P.C. Board
32	43046072	Solenoid Coil
33	43063070	Holder, Cord
34	43163016	Support
35	43146387	Switch-High-Pressure
36	43157140	Heater, Crk, Case
37	43146449	Capillary Tube I.D 2.4 (RAV-360AH8)
37	43146445	Capillary Tube (RAV-460AH8)

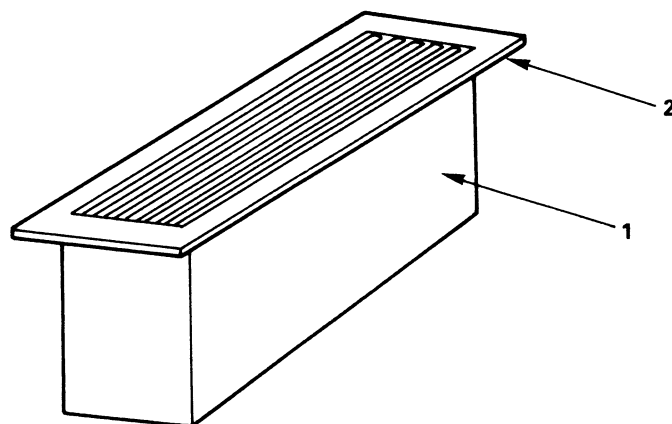
19-3 Ceiling Panel  
RBC-B260PE(W)  
RBC-B460PE(W)



Location No.	Part No.	Description
201	43401586	Inlet Grille
201	43401587	Inlet Grille
202	43401590	Panel in Right
202	43401591	Panel in Right
203	43401594	Panel in Left
203	43401595	Panel in Left
204	43102611	Panel Out-Side

Location No.	Part No.	Description
204	43102612	Panel Out-Side
205	43407019	Slider
206	43495584	Packin
207	43497004	Band-A
208	43497005	Band-B
209	43497008	Screw

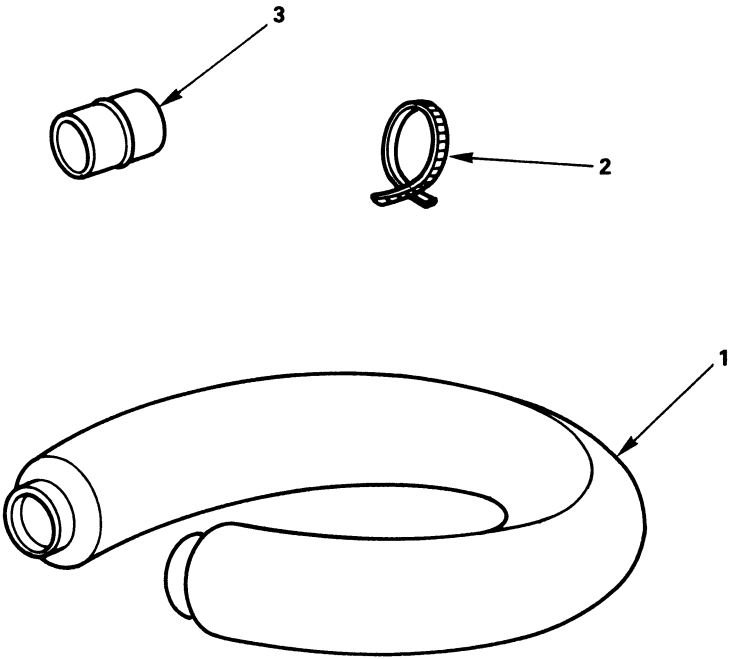
19-4 Blowout Unit  
RBC-BU1E (W)



Location No.	Part No.	Description
1	43183012	Blowout Chamber

Location No.	Part No.	Description
2	43183013	Panel Outlet

19-5 Flexible Duct  
RBC-FD202E



Location No.	Part No.	Description
1	43183014	Flexible-dact
2	43183015	Band

Location No.	Part No.	Description
3	43183016	Joint

710

**TOSHIBA**

FILE NO. A13-9501  
SUPPLEMENT

## SERVICE MANUAL

# AIR-CONDITIONER

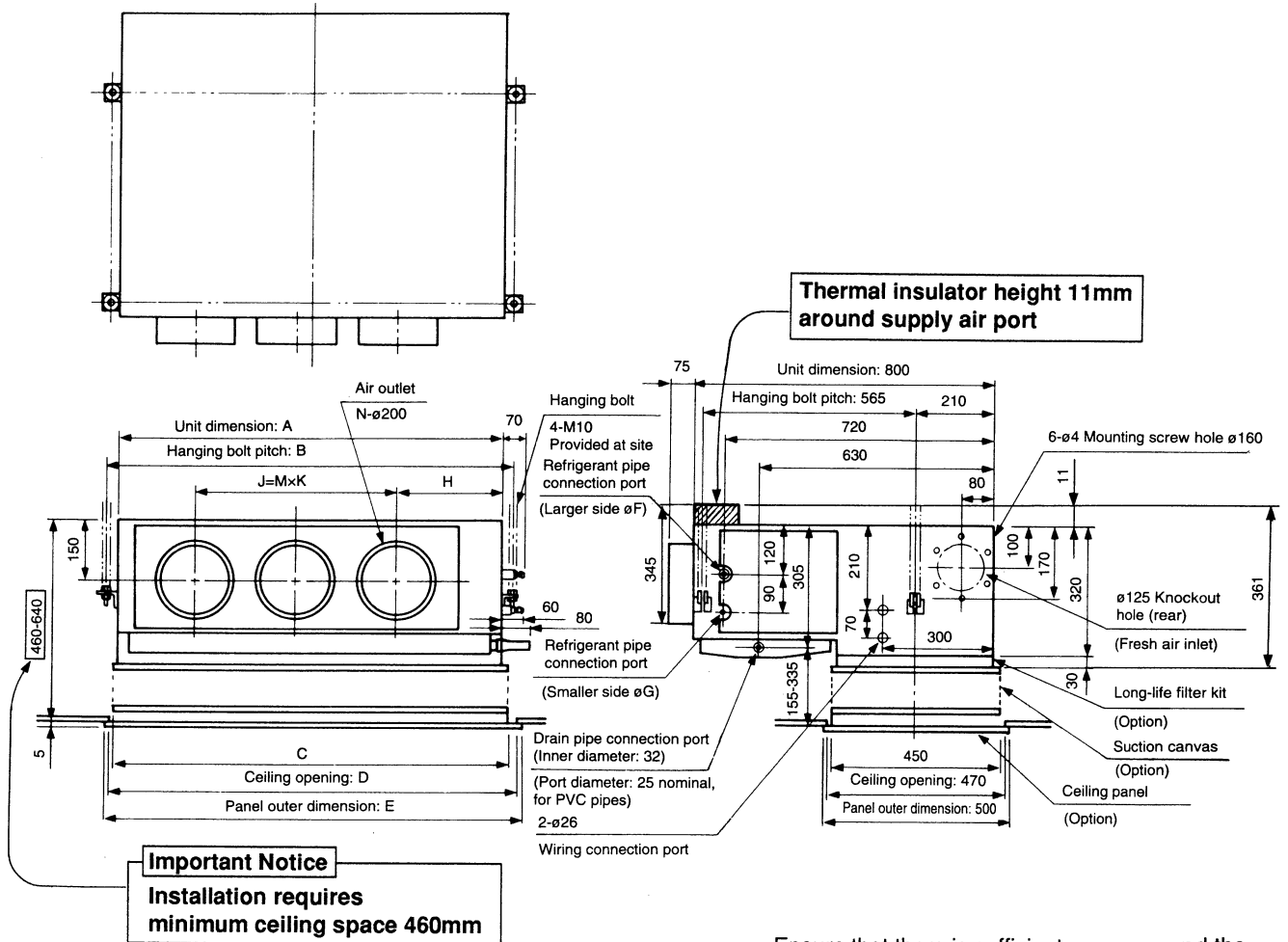
## SPLIT (BUILT-IN DUCT TYPE)

***RAV-260BH***  
***RAV-360BH***  
***RAV-460BH***

### – SUMMARY –

Use this supplement together with the original service manual File No. 300-856.

# CONSTRUCTION VIEWS



Ensure that there is sufficient space around the indoor units for installation and servicing.

## [Indoor unit]

(Unit: mm)

Model	A	B	F	G	H	J	K	M	N
RAV-260BH	1000	1050	15.9	9.5	252	580	290	2	3
RAV-360BH, 460BH	1350	1400	19.0			930	310	3	4

